# Butte Valley Wildlife Area
# Well Interference Investigation

December 1998
Department of Water Resources
Northern District

State of California
The Resources Agency
Department of Water Resources
Northern District

# Butte Valley Wildlife Area Well Interference Investigation

December 1998

Pete Wilson
Governor
State of California

Douglas P. Wheeler
Secretary for Resources
The Resources Agency

David N. Kennedy
Director
Department of Water Resources

# Foreword

Butte Valley in Siskiyou County is primarily an agricultural community which, through several decades of development, has come to rely on its groundwater resources to supplement surface water supplies. In addition to their use by farmers and ranchers, the natural lakes and wetlands in the valley have long provided waterfowl habitat along the Pacific flyway. Expansion and improvement of habitat in the Butte Valley Wildlife Management Area by the California Department of Fish and Game has also made use of the groundwater resources of the valley. Because of questions regarding groundwater well interference between these neighboring activities, the Department of Water Resources was contracted to investigate the groundwater resources of the northwestern portion of the valley and to evaluate the reported conflicting uses of groundwater.

The Department conducted a series of aquifer performance tests and monitored groundwater levels over the two-year study period. Evaluation of the test data shows that because of the unique geologic structures found in the area, hydraulic continuity between particular groups of wells exists, and mutual well interference can cause slightly increased operational drawdowns. This report presents the data and data evaluation requested by the Department of Fish and Game and provides some recommendations to limit adverse impacts.

Naser J. Bateni, Chief
Northern District

# Contents

**Foreword** .......... **iii**

**Organization** .......... **iv**

**Introduction** .......... **1**

**Conclusions and Recommendations** .......... **5**
Conclusions .......... 5
Recommendations .......... 7

**Previous Investigations** .......... **9**

**Geology and Hydrogeology** .......... **11**
Lake Deposits .......... 11
Butte Valley Basalt .......... 11
High Cascades Volcanics .......... 12
Hydrogeology of the Butte Valley Wildlife Area .......... 12

**Long-Term Trends** .......... **15**
General Land Use and Groundwater Development in Butte Valley .......... 15
BVWA Operation and Groundwater Development .......... 16
Precipitation Trends .......... 16
Groundwater Level Trends .......... 17

**Aquifer Performance Tests** .......... **25**
1997 Aquifer Performance Test .......... 25
Aquifer Characteristics .......... 28
Water Quality Testing .......... 29

**Holzhauser Ranch Spring-Flow Monitoring** .......... **33**
Pre-Test .......... 35
Test .......... 35
Recovery .......... 36
Storage Ponds .......... 36
Discussion of Spring-Flow Monitoring and Operational Impacts .......... 39

**Bibliography** .......... **41**

**Figures**


| | | |
|---|---|---|
| Figure 1 | Location Map | 2 |
| Figure 2 | Well Location and Geologic Map of the Study Area | 13 |
| Figure 3 | Diagrammatic Geologic Section | 14 |
| Figure 4 | Annual and Average Precipitation at Mt. Hebron Ranger Station (1942–1997) | 19 |
| Figure 5 | Annual and Average Precipitation at Mt. Hebron Ranger Station with Accumulated Departure from the Average (1983–1997) | 20 |
| Figure 6 | Department of Water Resources Groundwater Level Monitoring Wells | 21 |
| Figure 7 | Groundwater Levels in Well 47N/02W-23L01M | 22 |
| Figure 8 | Groundwater Levels in Well 47N/02W-27C01M | 23 |
| Figure 9 | Holzhauser Ranch Location Map | 34 |


**Tables**


| | | |
|---|---|---|
| Table 1 | Operation Schedule for Well 7A | 18 |
| Table 2 | Comparison of Well Interference | 26 |
| Table 3 | 1997 Aquifer Performance Test and Water Quality Monitoring | 31 |
| Table 4 | Groundwater Levels and Quality—Holzhauser Ranch Spring Monitoring | 36 |
| Table 5 | Groundwater Levels and Quality—Well 7A | 37 |
| Table 6 | Groundwater Quality and Spring-Flow—North Spring | 37 |
| Table 7 | Groundwater Quality and Spring-Flow—South Spring | 38 |
| Table 8 | Stage Measurements—North Pond | 38 |


**Appendices**


| | | |
|---|---|---|
| Appendix A | State Well Numbering System | 45 |
| Appendix B | Butte Valley Well Elevations—GPS Survey | 49 |
| Appendix C | 1997 Aquifer Performance Test Data | 57 |
| Appendix D | Monitoring Well Groundwater Levels | 81 |
| Appendix E | Analyses of Aquifer Characteristics | 93 |

# Introduction

Butte Valley Wildlife Area encompasses an area of about 13,200 acres in northeastern Siskiyou County. The facility is in the western portion of Butte Valley. The study area is about five miles west of the town of Macdoel. BVWA is managed by the Department of Fish and Game and includes Meiss Lake and surrounding lands. Some of these lands are flooded during the summer to provide brood habitat and during the fall to provide habitat for migratory waterfowl. These ponds are generally flooded with a surface water supply, although in surface-water-deficient periods, the surface water is augmented or replaced with groundwater. DFG has several wells in the area that provide a supplemental groundwater supply. The well used in Wetlands Management Unit 7A became a point of concern with the local community in 1992, during the 1987–92 drought, when it was reported to have caused an unacceptable level of interference with neighboring wells. In response to these local concerns, DFG requested the Department of Water Resources to evaluate the groundwater resource of the area, investigate the reported well interference problem, and make recommendations on how to reduce future impacts. The study area is shown on **Figure 1**.

The proposed study was outlined in a March 18, 1996 Interagency Agreement between the Department of Water Resources and the Department of Fish and Game. Study activities outlined in the agreement included:

- Compile and evaluate historical groundwater level information for the study area
- Monitor and evaluate groundwater levels of selected wells and determine seasonal water level changes
- Characterize the local aquifer system
- Conduct aquifer performance tests to estimate formation constants
- Investigate reported interference caused by Well 7A (27C01) on neighboring wells (see **Appendix A** for an explanation of well numbering)
- Perform a GPS survey to better locate wells in the study area
- Make recommendations for changes to DFG operations to reduce interference with local wells

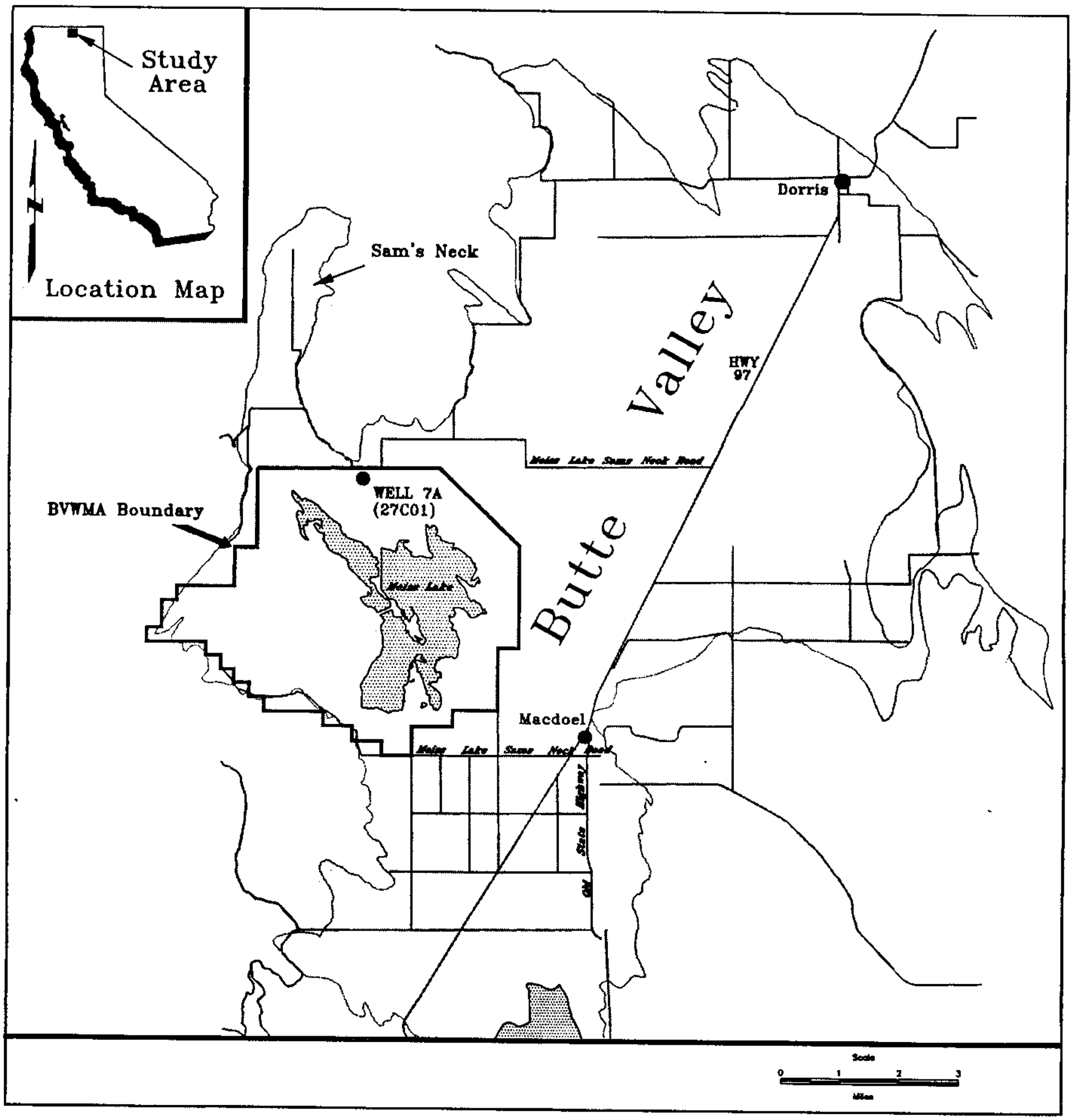



Figure 1. Location Map

To accomplish the study objectives, water well completion reports and groundwater level data in the study area were collected and analyzed. These data were used to select and field-locate wells that would be included in a study-area monitoring well network. The monitoring well network then was used to collect additional groundwater level data to better assess normal seasonal fluctuations. The monitoring well network was also used to observe groundwater levels during the subsequent aquifer performance testing, which was conducted to determine aquifer constants and evaluate the reported well interference. The wells in the network were surveyed using GPS to determine more precisely their locations and elevations. The GPS survey data are in **Appendix B**.

An initial aquifer performance test for DFG Well 7A was conducted in spring 1996 to obtain preliminary aquifer constants so a more accurate long-term test could be implemented. The initial two-day test was started on April 30, 1996. Based on the initial test results, a second aquifer performance test was scheduled for the spring of 1997. The second, long-term test was delayed for a year because the 1996 irrigation season began shortly after the initial test. The long-term test was started on May 2, 1997 and was conducted uninterrupted for a period of just over 10 days. During all the aquifer performance tests, the water discharged by the pump and groundwater levels in the surrounding monitoring well network were routinely monitored. The data were then analyzed to determine aquifer constants, which were then used to evaluate the reported well interference. The groundwater level data from the aquifer performance tests and the test results are presented in **Appendix C.**

During this well-interference investigation, additional concerns were raised regarding the effects of operation of Well 7A on flow in local area springs. As a result, a third test was conducted during August 1997. During that test, spring-flow from two springs on the Holzhauser Ranch and groundwater levels in selected wells were monitored to evaluate the impact to spring-flow caused by Well 7A.

# Conclusions and Recommendations

## Conclusions

Analysis of historical groundwater levels in the study area shows downward trends only during drought periods. By 1994, after the end of the most recent drought, spring groundwater levels were about 18 feet lower than in 1984, a period when recharge was above normal. However, because groundwater levels began recovering in recent wet years, groundwater levels should continue to recover to pre-drought conditions with continued normal recharge. Recent monitoring shows that spring 1998 groundwater levels are about 6 feet higher than 1994 groundwater levels. Also, monitoring shows spring-to-fall fluctuations are not as pronounced during normal and above-normal recharge periods. Therefore, at current rates of groundwater extraction, groundwater storage in the High Cascades Volcanics aquifer system does not appear to be in deficit in the study area.

The results of the aquifer performance tests on DFG Well 7A show that it does cause interference with adjacent wells. The amount of well interference, however, is small and varies with distance from Well 7A and each well's location relative to geologic structures or other variations in the aquifer system. The data also show that operation of other wells in the area contributes to additional local area interference.

The results of the aquifer performance test show that the High Cascades Volcanics aquifer system is highly transmissive. Transmissivities in the study area range from 205 $ft^2$/min to 422 $ft^2$/min. Storage coefficients (specific yield) range from 0.13 in Well 7A to 0.02 in Well 23L01. These are typical values for an unconfined aquifer system.

The aquifer performance test data show that there are several structural discontinuities that affect the response of nearby wells:

- The data appear to show strong north-south hydraulic continuity along the fault trace adjacent to Wells 22Q01 and 22Q02, which connects them hydraulically to Well 7A's production zone. During the 1997 aquifer performance test, groundwater levels in those two wells dropped about

8 feet, the most of any of the observation wells. These wells also recovered the most rapidly at the end of the test.

- Additionally, the area west of the fault adjacent to Well 7A seems to be somewhat isolated from the block to the east and has hydraulic continuity within its common fault-bounded area. The response of groundwater levels in Well 21B01 shows that adjacent wells located within this block, which are also developed in the High Cascades Volcanics, mutually interfere with other nearby wells, but not as much as adjacent wells along fault conduits. The response of groundwater levels in Well 23L01 shows the isolating effect of faults on adjacent offset fault blocks. Wells 23L01 and 21B01, east and west of the fault, respectively, are both roughly 1 mile from Well 7A, but the groundwater levels in well 23L01 only dropped about 2.5 feet, about one third the drawdown in Well 21B01.

- Similar well interference occurs between Wells 23G01, 23L01, 22Q01, and 22Q02. Groundwater levels in 23L01, 22Q01, and 22Q02 respond to operation of 23G01. Mutual interference by operation of this group of private wells can be seen on graphs of groundwater levels of all these wells (**Appendix C**). Of this group, Well 22Q02 has the greatest effect on 22Q01, due to its proximity and the hydraulic connection in the talus deposits along the fault zone. Groundwater level measurements made during aquifer performance testing show that concurrent operation of Wells 22Q02 and 23G01 can combine to lower groundwater levels in well 22Q01 by 10 to 11 feet. It appears that 6 to 7 feet of drawdown is due to operation of Well 22Q02 and about 4 feet due to operation of the more distant well.

- Well 22P01, developed only in the Lake Deposits, responded only slightly to operation of Well 7A, showing that, except where the Lake Deposits are interfingered with alluvial fan and/or talus deposits, the hydraulic continuity between the High Cascades Volcanics and Lake Deposits is weak.

- The results of the August 1997 test to determine the effects of operation of Well 7A on flow in two springs on the Holzhauser Ranch show that, over the 5 ½-day test, flow in one spring dropped by 1.6 gpm and flow in the second by 0.4 gpm. These reductions in flow were about 10 percent of the initial spring flows. Based on the monitoring data, it appears that operation of Well 7A may have a minimal effect on the flow in both springs. In addition, other wells in the area were also operating during the test; it is likely that the operation of other wells may also contribute to reduction in spring-flow.

In summary, aquifer performance tests on DFG Well 7A indicate that operation of the well causes moderate to small impacts on groundwater levels in some nearby wells and springs. Longer periods of operation can cause nearly 8 feet of drawdown in Well 22Q01. This domestic well, which is less than a quarter mile north of Well 7A, has limits to its operational range due to its shallow depth and the pump setting; therefore, operation of all nearby large-capacity wells impacts groundwater levels in this well. Impacts are most severe when several nearby wells are operating. The concurrent operation of Well 7A and other nearby wells produces a cumulative 18 to 19 feet of drawdown in Well 22Q01.

## Recommendations

The following recommendations should provide some improvement to the well interference problem in the vicinity of Well 7A. The recommendations are divided into short-term and long-term solutions. These are technical solutions that may or may not be compatible with the operation of the BVWA.

**Short-Term:**

- Operate Well 7A at lower extraction rates
- Alternate operation of Well 7A to avoid concurrent operation with other area wells

**Long-Term:**

- Lower pump bowls in private wells, where possible
- Deepen private wells, or replace them as needed
- Add new wells for Wildlife Management Unit 7A to disperse the concentration of operating wells and increase the distance between mutually interfering wells
- Provide storage facilities to implement off-season groundwater extraction scheduling

# Previous Investigations

Several investigators have evaluated the hydrogeology of the Butte Valley area. None of these studies, however, focused specifically on the current area of concern. Following is a synopsis of the existing hydrogeology literature for the Butte Valley area.

In 1960 the U.S. Geological Survey published Water-Supply Paper 1491, entitled *Geology and Ground-Water Features of the Butte Valley Region* (Wood, P.R. 1960). This report is the result of a comprehensive groundwater quantity and quality investigation of Butte Valley and some adjacent areas to the east. Wood provided an extensive literature review and summarized much of the geological information prepared by Williams and others in the late 1940s. This earlier work provided much of the geologic basis for hydrogeologic mapping, categorization, monitoring, and evaluation.

The California Department of Water Resources published the *Klamath River Basin Investigation* in July 1964 as Bulletin 83. Among other objectives, this report provided an inventory of surface waters, groundwaters, and water quality within the Klamath River Basin, of which the Butte Valley Region was a minor part. Much of the investigative work for the Butte Valley groundwater chapter was prepared in the mid- to late 1950s by the U.S. Geological Survey.

In the March 1968 Office Report entitled *Dorris-Butte Valley Water Quality Investigation*, the Department of Water Resources conducted a reconnaissance investigation to determine the extent and origin of elevated arsenic concentrations in Dorris area groundwater.

In 1973 the Department of Water Resources published Bulletin 105-4, *Water Management for Wildlife Enhancement in Butte Valley*. This investigation evaluated the feasibility of developing a wildlife area on federal land managed by the U.S. Forest Service in the Meiss Lake area of Butte Valley.

In 1980 the U.S. Bureau of Reclamation published *Butte Valley Division, Klamath Project, Feasibility Ground-Water Geology & Resources Appendix*. This publication summarized a study that was commissioned to assess the present and ultimate groundwater conditions and resources of Butte Valley. Particular emphasis was placed on the groundwater resources of the High Cascades Volcanics and the "safe groundwater supply."

The U.S. Bureau of Reclamation's May 1981 *Concluding Report for the Butte Valley Division* abstracted information from their October 1980 *Feasibility Ground-Water Geology & Resources Appendix* discussed above. This report was directed toward the overall feasibility of providing Butte Valley with federal water from the Klamath Project.

In 1993 the Department of Water Resources prepared a Memorandum Report that summarized the results of a short-duration aquifer performance test on Department of Fish and Game Well 7A. The purpose of the test was to determine the influence of normal well operations on nearby deep and shallow wells.

# Geology and Hydrogeology

The principal aquifer systems in Butte Valley are Lake Deposits, the Butte Valley Basalt, and the High Cascades Volcanic rocks. In the valley, the volcanics and Butte Valley Basalt are covered with Lake Deposits. The Lake Deposits behave as a separate aquifer system and, in most areas, confine the underlying volcanic aquifer systems. The yields and specific capacities of wells in the volcanic rocks and Lake Deposits range widely, but they are generally low for the Lake Deposits, and generally high for the High Cascades Volcanic rocks and the Butte Valley Basalt. **Figure 2** shows the generalized geology of the study area.

## Lake Deposits

The Lake Deposits are Pleistocene to Recent in age and consist of semi-consolidated deposits of relatively impermeable silt, clay, volcanic ash, with lenses of diatomaceous clay and stringers of more permeable sand and gravelly sand. These deposits as a whole generally thicken to the west and unconformably overlie the older volcanic rock. In the central part of the valley, a calcium-carbonate cemented clay hardpan is usually present within several feet of the surface. This layer impedes the vertical recharge of water into the underlying lake deposit aquifer system. The Lake Deposits typically vary widely in their ability to transmit water.

The Lake Deposits around the margin of the basin are typically more permeable than those found in the mid-basin area. Along the margins of the valley, the Lake Deposits are interlayered with volcanic rocks, and they can yield moderate to high amounts of water to wells. In the southern part of the basin, the Lake Deposits interfinger with the Butte Valley Basalt, and wells in this area can yield 4,000 gpm or more because of the influence of the basalt layers. The Lake Deposits to the east of Highway 97, especially near the eastern border of the valley, contain a larger percentage of sand, and wells here can yield up to 2,500 gpm.

## Butte Valley Basalt

The Butte Valley Basalt has historically been the primary water-producing aquifer system in the southern portion of Butte Valley. It is characterized by a series of comparatively thin lava flows, which are Late Pleistocene to

Recent in age. These lava flows are broken by a system of nearly vertical joints or shrinkage cracks that facilitate the vertical migration of groundwater into the zone of saturation. Individual wells developed in this aquifer system can produce up to 4,000 gpm.

## High Cascades Volcanics

The High Cascades Volcanics are very permeable and are important regionally as a groundwater source. They consist of olivene-basalt and basaltic andesite with discontinuous layers of tuff and tuff-breccia. The High Cascades Volcanics are Pliocene to Pleistocene in age.

## Hydrogeology of the Butte Valley Wildlife Area

The principal aquifer systems in the study area are the High Cascades Volcanic rocks and the sedimentary Lake Deposits. The Lake Deposits overlie the volcanic rocks. However, a short distance north, the volcanic rocks are elevated along a series of north-south trending faults and are exposed at the surface.

A minor but important geologic subunit within the Lake Deposits is volcanic talus. Coarse talus rubble occurs at the base of the steep fault scarp north of Well 7A. These deposits serve as recharge conduits for the aquifers within the Lake Deposits, while the associated fault connects these shallow zones with the deeper producing zone of Well 7A and several other deeper irrigation wells in the area. This relationship is shown in **Figure 3**.

Faulting, the variability of aquifer materials, and the interconnection of aquifer units control the distribution and flow of groundwater in the study area. These factors enhance, diminish, or block the flow of groundwater. Some faults and fractures act as conduits for groundwater flow along their trace, and others act as barriers to groundwater flow. In many cases, faulting offsets aquifer units, thereby juxtaposing more permeable aquifers against less permeable units such as clay beds or unfractured rock. The contrasting permeability of the Lake Deposits and High Cascades Volcanics generally limits the amount of vertical hydraulic continuity between these two aquifer systems.

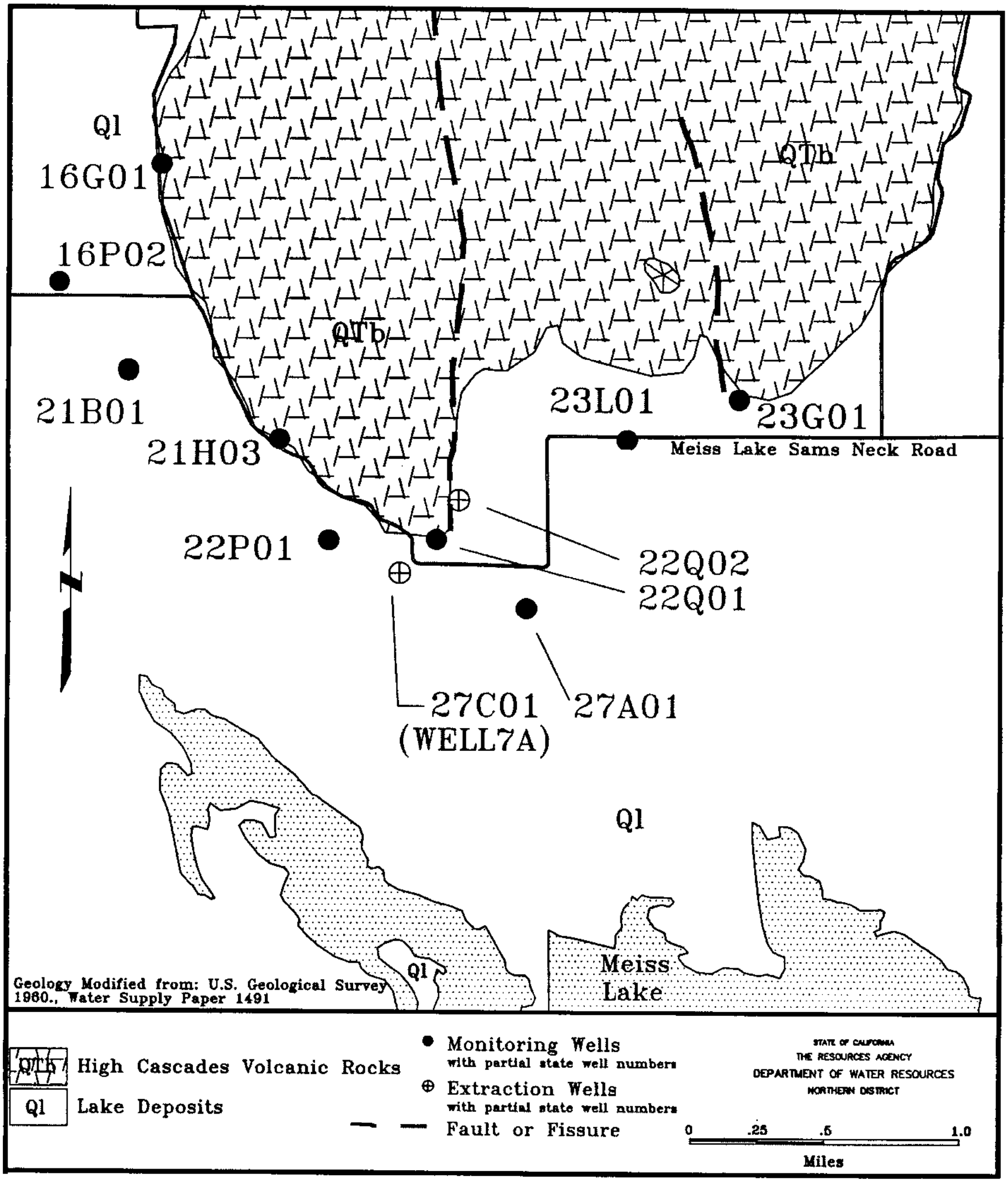



Figure 2. Well Location and Geologic Map of the Study Area

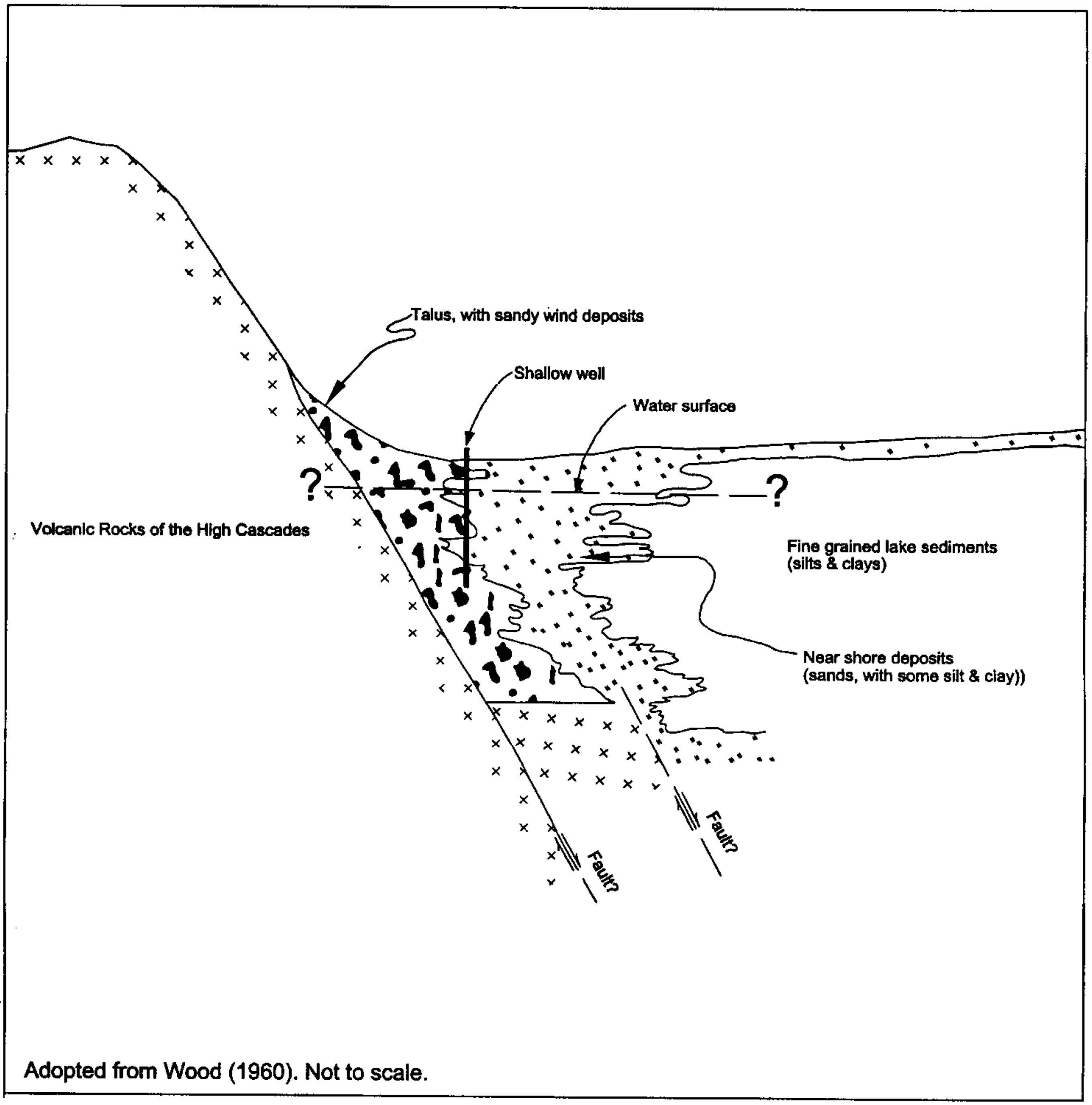



**Figure 3. Diagrammatic Geologic Section**

# Long-Term Trends

The primary factors that affect long-term changes in groundwater levels are the degree of groundwater development, annual extraction rates including natural discharge, and the ongoing patterns of recharge. An overdeveloped groundwater system will have reduced seasonal availability of supply, increased well interference, and higher operating lifts over time. Deficits in precipitation will lead to reduced annual recharge and declining water levels.

## General Land Use And Groundwater Development in Butte Valley

Since the early 1950s, land use and groundwater use in Butte Valley have steadily increased. The principal agriculture in Butte Valley is irrigated pasture and alfalfa, with minor row and field crops such as strawberries, potatoes, onions, wheat, oats, barley, and sugar beets. The annual surface water supply is up to about 20,000 acre-feet. As the total agricultural demand in the basin has grown over time, the amount of groundwater extracted to meet these demands also increased. In 1953, about 22,200 acre-feet of groundwater was extracted to provide the required supplemental water supply for about 10,440 acres. By 1991, the amount of groundwater extraction increased to about 81,000 acre-feet to irrigate about 45,000 acres. The total irrigated acreage and water demand in the valley should remain fairly constant into the future because nearly all the arable land in the valley is now in production. Currently, the agricultural applied water demand in Butte Valley is estimated to be about 2.2 acre-feet/acre, of which 1.8 acre-feet/acre is supplied by groundwater.

Variations in the amount of groundwater extracted in a given year depend on the availability of surface water as well as on the total irrigated acreage. Therefore, in wet years less groundwater is needed to augment surface supplies, while in dry years more groundwater is needed. The amount of usable groundwater storage in the valley has been estimated at slightly more than 100,000 acre-feet, so demand has reached slightly more than 80 percent of the estimated available groundwater supply.

## BVWA Operation and Groundwater Development

Since the 1980s, when the BVWA was established, an average of about 3,000 acre-feet of groundwater has been extracted annually to meet water needs for wildlife habitat. The total annual water demand for the 13,200 acres of the refuge is about 25,000 acre-feet. The highest annual amount of groundwater extracted was nearly 5,300 acre-feet in 1992; but in some years as little as about 2,000 acre-feet was needed. A 1996 DFG Management Plan outlined a proposed 500 acre-foot increase in groundwater development for habitat enhancement, for a projected average annual need of about 3,500 acre-feet. The current applied groundwater demand in BVWA is about 1.1 acre-feet/acre, which is about 0.7 acre-feet/acre less than the surrounding agricultural community.

Well 7A (27C01), installed in 1992, is used to flood and maintain about 100 to 200 acres of wetlands for summer brood habitat in Unit 7A. The well is at the north end of the wildlife area. In the fall, an additional 100 acres are flooded for migrating birds. Since 1993, when Well 7A was first operational, it has extracted an annual minimum of 17 acre-feet in 1994 and a maximum of 498 acre-feet in 1995 (**Table 1**). The five-year annual average groundwater extraction by Well 7A is about 277 acre-feet. This is about 13 percent of the yearly BVWA groundwater production

## Precipitation Trends

To evaluate changes or trends in groundwater levels, it is also necessary to determine the trends in precipitation that determine the amount of groundwater recharge that occurs. **Figures 4 and 5** show the precipitation pattern in Butte Valley over a 55-year period from 1942 to 1997 and a 14-year period from 1983 to 1997, respectively. The second graph also shows the accumulated departure from the average.

Average annual precipitation in Butte Valley is 12.15 inches. **Figure 4** shows that the extended drought periods of the mid-1940s to 1950s, and the mid-1980s to early 1990s, seem to have been more severe than the drought of the late 1970s. **Figure 5,** the graph of the accumulated departure from average, shows that from 1988 to 1995 precipitation was well below average.

## Groundwater Level Trends

Evaluation of groundwater level changes in Butte Valley is based on levels from a well on DWR's long-term groundwater level monitoring network. In Butte Valley, the network consists of 29 irrigation and domestic wells that are monitored once in the spring and once in the fall. The spring measurement is used to determine the highest groundwater level for the year, and the fall measurement records the lowest. **Figure 6** shows the groundwater monitoring network for Butte Valley.

Variation in precipitation is reflected in groundwater levels for the area. Historical groundwater level trends are best evaluated by examining groundwater levels in well 23L01M, which has the longest complete record for any well in the study area. **Figure 7** shows the annual groundwater level changes in this well from 1976 to the spring of 1998 and includes groundwater level measurements made during the current study. This well is about a mile east of Well 7A (27C01), and like Well 7A, produces primarily from the High Cascades Volcanics aquifer system. The record for this well shows a downward trend in groundwater levels into the early to mid-1990s. However, at the end of the most recent drought, in about 1994 to 1995, the downward groundwater-level trend reversed and began to recover. Similar trends are seen in other monitoring wells throughout Butte Valley.

In a shorter time period, the groundwater levels for Well 7A (**Figure 8**) show that from fall 1992 to spring 1998, spring groundwater levels have continued to rise. In the three most recent years, spring groundwater levels are higher than in the preceding drought years. Groundwater levels are only low in the irrigation season, and the lowest recorded levels reflect the concurrent operation of wells and well interference.

Evaluation of the precipitation record and groundwater level trends seems to indicate clearly that at current levels of groundwater extraction, groundwater levels and storage may decline in years without average or above precipitation. But the record also indicates that groundwater levels in the High Cascades Volcanics aquifer system recover following drought periods.

**Table 1. Operation Schedule for Well 7A**
(Acre-feet Extracted)

| Year | Period From | Period To | Total Annual Extraction | Comment |
|---|---|---|---|---|
| | 7/7 | 7/15 | | |
| **1993** | 7/22 | 7/22 | **123 Acre-feet** | Aquifer performance test—est. 2500 gpm |
| | 8/2 | 8/4 | | |
| | 8/11 | 8/12 | | |
| **1994** | 8/3 | 9/30 | **17 Acre-feet** | Intermittent operation |
| | 7/10 | 7/17 | | |
| | 7/26 | 7/28 | | |
| | 7/31 | 8/2 | | |
| **1995** | 8/14 | 8/17 | **498 Acre-feet** | |
| | 8/28 | 8/31 | | |
| | 9/6 | 10/4 | | |
| | 10/11 | 10/14 | | |
| | 4/30 | 5/2 | | Aquifer performance test—est. 2600–2900 gpm |
| | 7/22 | 7/26 | | |
| | 8/13 | 8/16 | | |
| | 8/19 | 8/22 | | |
| **1996** | 9/11 | 9/23 | **348 Acre-feet** | |
| | 9/30 | 10/2 | | |
| | 10/9 | 10/10 | | |
| | 11/4 | 11/8 | | 1500 gpm |
| | 11/12 | 11/15 | | 1500 gpm |
| | 4/29 | 5/9 | | Aquifer performance test—2800 gpm |
| | 8/4 | 8/4 | | 1500 gpm |
| **1997** | 8/13 | 8/18 | **399 Acre-feet** | Well interference test—2800 gpm, Holzhauser springs |
| | 9/5 | 9/6 | | 1500 gpm |
| | 9/15 | 10/24 | | 1500 gpm |

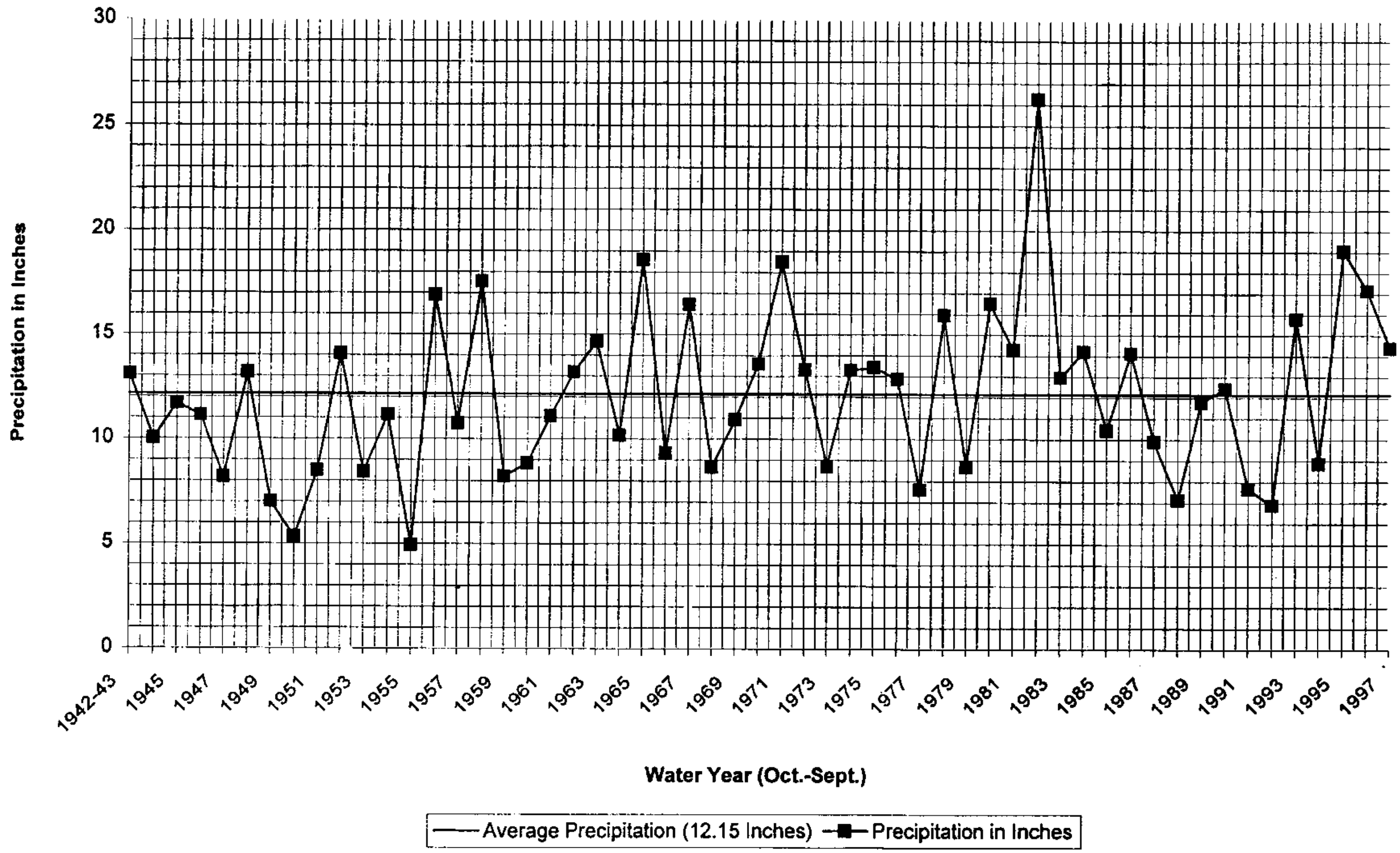



**Figure 4. Annual and Average Precipitation at Mt. Hebron Ranger Station** (1942–1997)

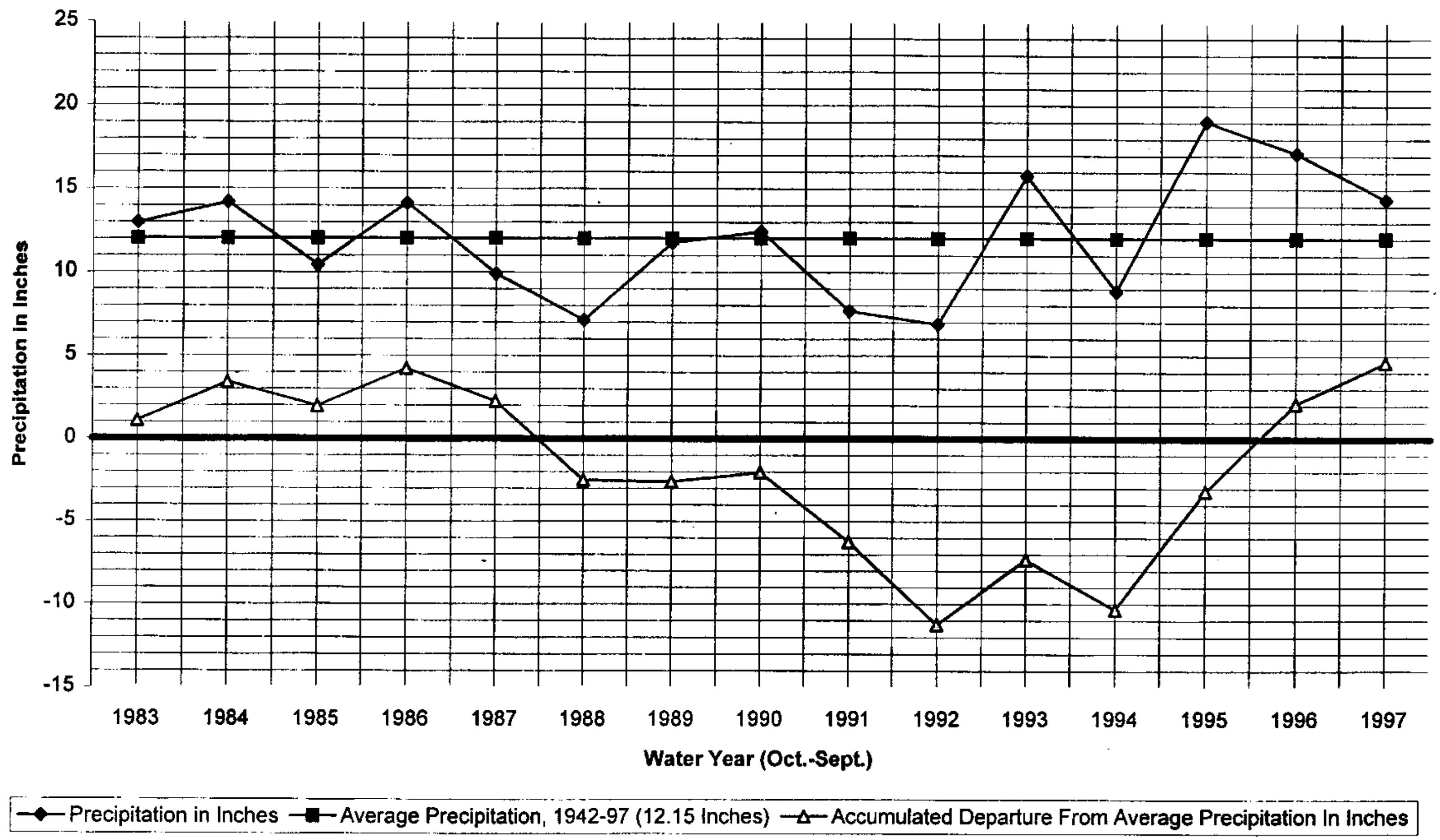



**Figure 5. Annual and Average Precipitation at Mt. Hebron Ranger Station with Accumulated Departure from the Average** (1983–1997)

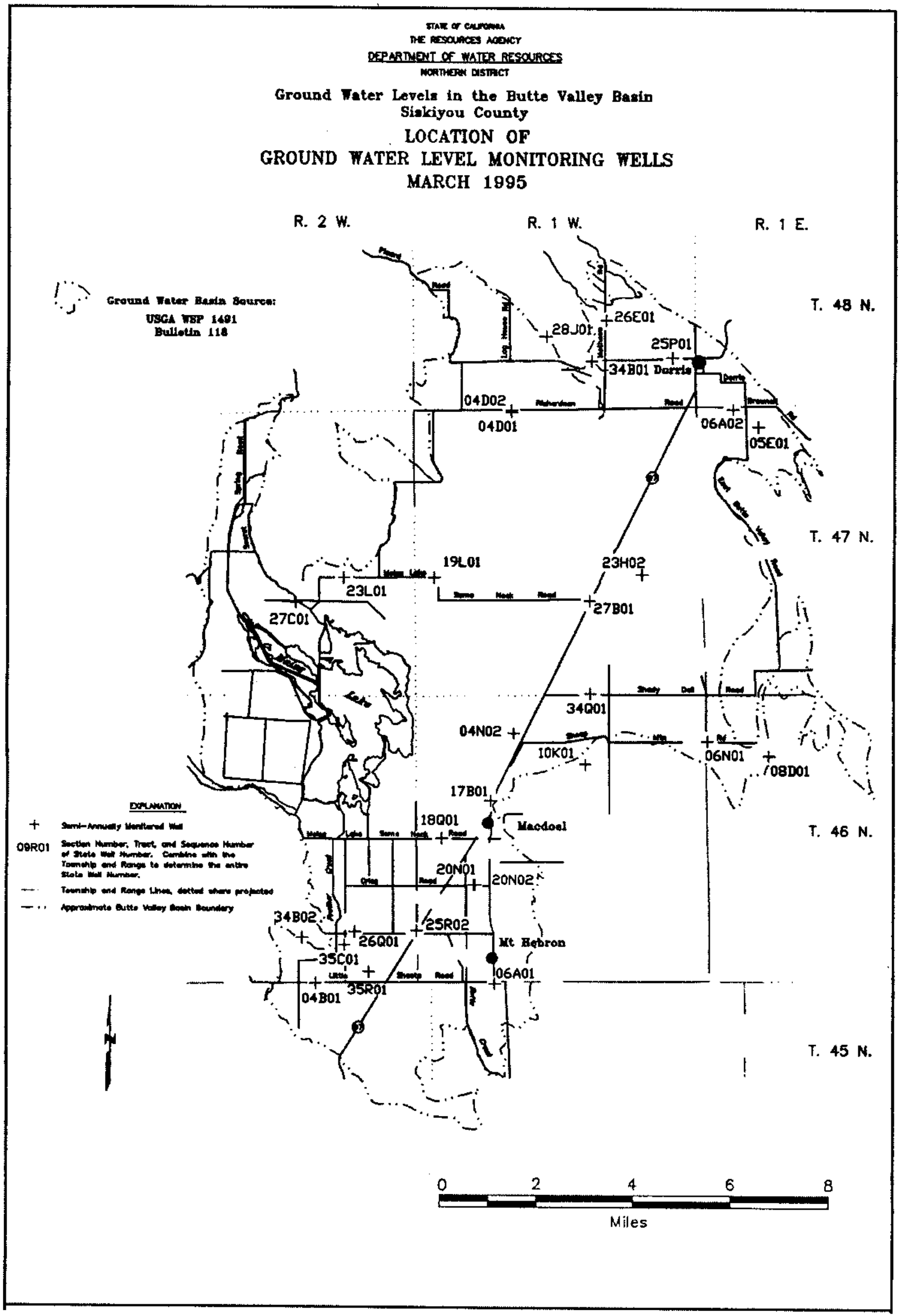



**Figure 6. Department of Water Resources Groundwater Level Monitoring Wells**

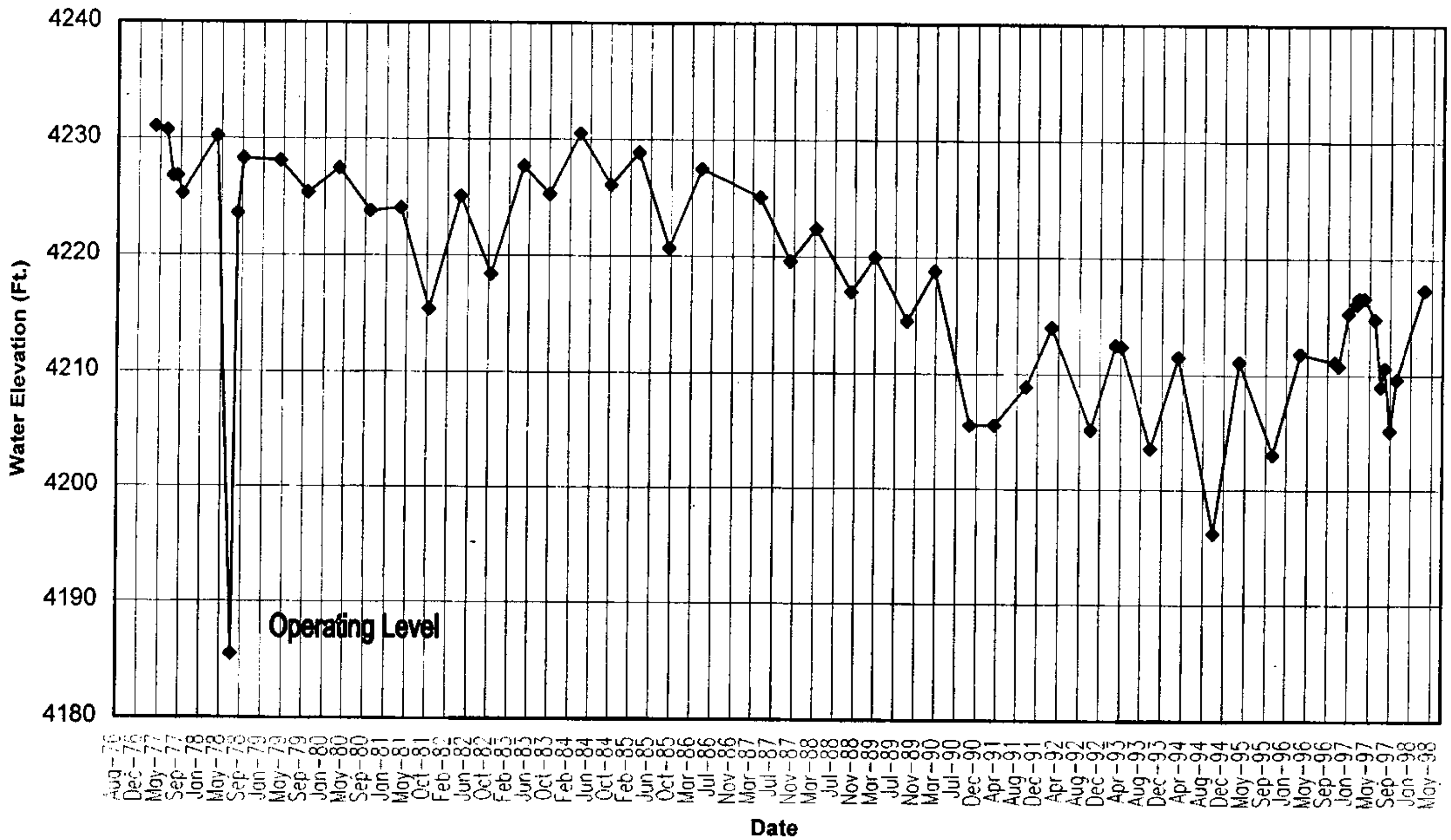



**Figure 7. Groundwater Levels in Well 47N/02W-23L01**

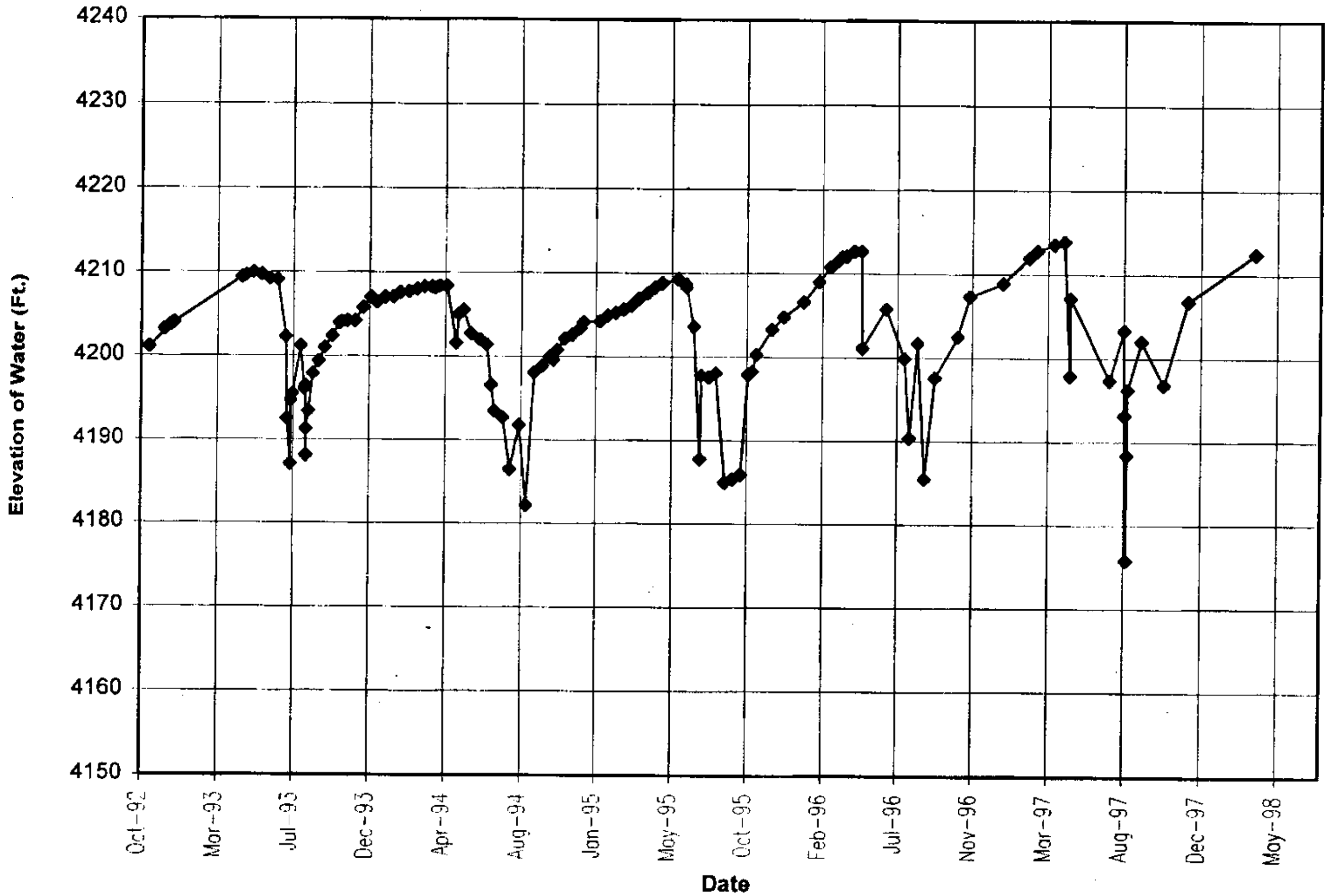



**Figure 8. Groundwater Levels in Well 47N/02W-27C01M**

# Aquifer Performance Tests

In July 1993, a short-duration aquifer performance test was conducted on DFG Well 7A (27C01). The purpose of this reconnaissance-level test was to determine the influence of Well 7A on surrounding deep and shallow wells during normal operations. The test duration was insufficient to fully examine the extent of impacts on nearby wells. The test did suggest, however, that groundwater levels in some nearby wells were impacted, but not to a significant degree. The results of this test are detailed in a 1993 DWR Memorandum Report, *Butte Valley Aquifer Test.*

The initial test did not convince the local groundwater users that Well 7A was not causing significant adverse impacts. In response to the continued controversy, DFG again contracted with DWR to perform a more in-depth study to quantify the reported interference impacts caused by Well 7A and to better characterize the local aquifer system. In 1996, a preliminary test was conducted on Well 7A to determine the necessary length of a longer-term test, and the longer test was scheduled for the spring of 1997. The preliminary test was run for slightly over two days starting on April 30, 1996. During this test, water levels in six irrigation wells and four domestic wells were monitored. This test confirmed that a longer-term aquifer performance test was necessary to better characterize the aquifer system and to determine the full extent of well interference.

## 1997 Aquifer Test

A long-term aquifer performance test was conducted on Well 7A in spring 1997. This test was run for slightly over 10 days starting on April 29. Five irrigation wells, one stock well, and one inactive domestic well were used as observation wells during the test. The flow rate in Well 7A was measured with an ultrasonic flow-meter throughout the test, at a rate of about 2,800 gpm. The maximum drawdown in Well 7A was about 16 feet during the 10-day test. The measured specific capacity of the well was about 275 gpm/ft of drawdown, which correlates closely to the 1993 test results.

The seven wells monitored during the test are shown on **Figure 2** (page 13) **Table 2** identifies these wells and summarizes the maximum drawdown responses during the 1993, 1996, and 1997 tests. It also shows the aquifer zone(s) each well monitors, based on well completion reports and historical

**Table 2. Comparison of Well Interference**
Well 7A (27C01M)

| Partial State Well No. | Maximum Drawdowns 1993 6.8-hour test | 1996 2-day test | 1997 10-day test | Owner Identification | Distance from Well 7A in feet | Producing Aquifer Zone |
|---|---|---|---|---|---|---|
| **27C01** | **8.2 ft** | **11.6 ft** | **16.0 ft** | **DFG test Well 7A** | **0** | **High Cascades Volcanics** |
| 16G01 | NM | 1.14 ft | NM | Sammis Dom | 9,760 | High Cascades Volcanics |
| 16P02 | NM | 3.02ft | 6.16 ft | Miller W Irr | 7,930 | Lake Deposits + High Cascades Volcanics |
| 21B01 | no response | 3.68 ft | 7.32 ft | Tonelli W Irr | 6,260 | High Cascades Volcanics |
| 21H03 | NM | 0.09 ft | NM | Tonelli Dom | 4,720 | High Cascades Volcanics |
| 22P01 | no response | 0.09 ft | 0.72 ft | Cavener Stock | 1,210 | Lake Deposits |
| 22Q01 | 1.8 ft | 3.98 ft | 7.77 ft | Miller Dom | 820 | Lake Deposits (Talus)/High Cascades Volcanics |
| 22Q02 | 0.8 ft | 4.17 ft | 7.97 ft | Miller Irr | 1,350 | Lake Deposits (Talus)/High Cascades Volcanics |
| 23G01 | NM | 1.0 ft | 4.74 ft* | Rowlett Irr | 7,320 | High Cascades Volcanics |
| 23L01 | no response | 0.32 ft | 2.59 ft | Tonelli E Irr | 5,240 | Lake Deposits + High Cascades Volcanics |
| 27A01 | no response | NM | NM | DFG windmill well | 2,750 | Lake Deposits |

*Well 23G01 was operating during the test on Well 7A. The starting depth to water in 23G01 was 38.9 ft.
During the test on Well 7A, 23G01 had an additional 4.74 ft of drawdown with a final depth to water at 43.64 ft.

NM = No measurement

groundwater level responses. Hydrographs for the monitoring wells measured during the 1997 test are included as **Appendix D**. These hydrographs include background groundwater level information recorded prior to, and following, the test. These hydrographs do not include the groundwater levels monitored during the test, which are presented as time-drawdown graphs in **Appendix C.** This appendix also includes a tabulation of the groundwater level data from the aquifer performance test. The results of the test, by individual observation well, are summarized below:

**Miller Irrigation West (16P02)**
The maximum drawdown over the test was slightly more than 6 feet. By the following day the groundwater level had recovered by about 1.5 feet from the maximum drawdown.

**Tonelli Irrigation West (21B01)**
The maximum drawdown over the test was 7.3 feet. Within a few hours the groundwater level had recovered by nearly a foot, and by the following day had recovered by almost two feet from the low.

**Cavener Stock (22P01)**
The maximum drawdown over the test was 0.7 foot. The slight decline in the groundwater level occurred very gradually over the 10 days of the test, and when the test operation of Well 7A ended, the level continued downward for another half day.

**Miller Domestic (22Q01)**
The maximum drawdown over the test was nearly 7.8 feet. At the end of the test, the groundwater level began to rise immediately by a few tenths of a foot, and by the following day the groundwater level had risen by about 2 feet from the low.

**Miller Irrigation East (22Q02)**
The maximum drawdown over the test was nearly 8 feet. At the end of the test, the groundwater level rose by almost a foot in the first hour, and by the following day the groundwater level had risen by almost 3 feet.

**Rowlett Irrigation (23G01)**
Periodic measurements of this well recorded an operating level of just less than 39 feet near the beginning of the aquifer test and a maximum of about 43.6 feet at the end of the test, for a total test drawdown of 4.7 feet. The groundwater level had recovered by about 1.5 feet by the following morning. A previous static level for this well was 30.7 feet, so the estimated operating drawdown for this well with no other influence is about 8 feet.

**Tonelli Irrigation East (23L01)**
The maximum drawdown over the test was almost 2.6 feet. At the end of the test, Well 23G01 began operating, so recovery data are not clear. With Well 7A off, the groundwater level in 23L01 went down two additional tenths of a foot; therefore, it is apparent that operation of 23G01 affects groundwater levels in this well also.

## Aquifer Characteristics

Estimates of aquifer characteristics are based on computer analysis. The individual well analyses are included as **Appendix E**. The aquifer characteristics determined from the test revealed that the aquifer system transmissivity was relatively constant throughout the study area. The calculated transmissivity ranged from 205 to 422 $ft.^2/min$. These transmissivity calculations were done assuming confined aquifer conditions. The test results indicate that the aquifer system is very transmissive. Typically, wells in very transmissive aquifer systems develop broad cones of depression that migrate out from the well very rapidly once the well is started. The magnitude of the drawdown, however, is generally small.

Although the transmissivity in the study area is fairly uniform, the test did reveal that the fault just east of Well 7A acts as a partial barrier to groundwater flow. The test data also reveal that the fault trace acts as a very transmissive conduit for groundwater along its trace. The cone of depression created during the test was asymmetrical around Well 7A. The cone was attenuated on the east side of the fault trace, indicating a contrast in permeability between the fault zone material and the adjacent aquifer material. Well 22Q01, which is almost directly on the fault trace, had the highest drawdown-distance ratio, indicating a high degree of connectivity and transmissivity between the fault zone and the aquifer system in the vicinity of Well 7A. Other faults in the area probably influence groundwater flow in a similar fashion.

The aquifer system storage coefficient determined from test data also was relatively constant. The storage coefficients ranged from 0.001 to 0.002 for those wells that remained confined during the test. This indicates a low degree of confinement, which would be expected because the wells are close to the margin of the valley floor. In those wells where the groundwater levels were drawn down below the confining layer, the storage coefficient (specific yield) ranged from 0.13 at Well 7A to 0.02 at Well 23L01. These are typical values for aquifer systems in an unconfined state.

## Water Quality Testing

During the 1997 aquifer performance test, some basic water quality parameters were monitored. Although this monitoring was not within the original scope of the work outlined in the Interagency Agreement, it was done to better determine the vertical hydraulic conductivity between the Lake Deposits aquifer system and the High Cascades Volcanics aquifer system. This testing was limited to monitoring Well 7A and Well 22P01. These two wells were selected because Well 7A is developed in the High Cascades Volcanics, and the stock well is producing from the Lake Deposits.

The water quality characteristics of the two aquifer systems are distinctly different, so it was postulated that changes in groundwater quality that occurred during the test would quantify the amount of vertical leakage. **Table 3** shows Well 7A operating rates and drawdowns at selected times over the test period. Specific conductance and temperature values for Well 7A and for nearby Well 22P01 are also shown.

The data show the dramatic differences in the thermal and chemical characteristics of these two aquifer systems. Temperatures in the Lake Deposits are about 8 degrees cooler than in the underlying High Cascades Volcanics, and the electrical conductivity is nearly double. The results of the test indicate that wells developed in the Lake Deposits are slightly influenced by extractions from the underlying High Cascades Volcanics. First, there was a decline of 0.7 foot in the groundwater level of Well 22P01 over the test period, and second, a distinct thermal drop occurred in Well 7A early in the test.

During the 1996 and 1997 tests, the temperature of the water produced by Well 7A dropped from 18.1–18.3°C to 17.5–17.7°C within the first 24 hours of operation. This could suggest thermal stratification of the groundwater in the High Cascades Volcanics, since the test began following the winter and early spring, just prior to the irrigation season. It could also indicate that the onset of extraction-induced leakage begins very early in the extraction cycle and is sustained through the season.

However, since no measurable changes in electrical conductivity were noted, and since the piezometric surface was depressed a maximum of only about 11 feet in Well 7A during the early portion of the test, it is difficult to evaluate the amount of vertical leakage that is occurring. These effects become even more difficult to evaluate when faulting and fracturing of the area are considered. The aquifer performance test shows increasing rates of drawdown with time, which not only indicate no substantial net recharge during the test, but also suggest a groundwater depletion or "boundary" effect, probably due to a structural barrier that locally limits the extent of the aquifer.

**Table 3. 1997 Aquifer Performance Test and Water Quality Monitoring**

| Elapsed Test Time, in minutes | Well 7A Flow, in gpm | Well 7A Drawdown, in feet | Well 7A Temp, in °C | Well 7A EC, in µmhos/cm | Stock Well Drawdown, in feet | Stock Well Temp, in °C | Stock Well EC, in µmhos/cm |
|---|---|---|---|---|---|---|---|
| <-1160> | - | - | - | - | Pretest | 10.4 | 645 |
| 0 | 0 | 0 | - | - | 0 | | |
| 195 | - | - | - | - | 0 | 10.6 | 640 |
| 215 | - | 8.7 | 18.1 | 345 | - | - | - |
| 1455 | - | - | - | - | 0 | 10.6 | 665 |
| 1480 | - | 10.7 | 17.7 | 350 | - | - | - |
| 1790 | 3700 | 10.9 | 17.4 | 350 | - | - | - |
| 2993 | - | - | - | - | 0.1 | 10.4 | 700 |
| 3017 | 7750 | 11.6 | 17.8 | 345 | - | - | - |
| 4320 | 4260 | 12.1 | 17.7 | 340 | - | - | - |
| 4650 | 4450 | 12.2 | 17.7 | 345 | - | - | - |
| 5870 | 5110 | 12.6 | 17.7 | 350 | - | - | - |
| 5986 | - | - | - | - | 0.3 | 10.8 | 680 |
| 6000 | 4825 | - | 17.7 | 345 | - | - | - |
| 6135 | 4360 | 12.7 | 17.7 | 345 | - | - | - |
| 7140 | 5280 | 13.1 | 17.7 | 350 | - | - | - |
| 7350 | 4380 | 13.2 | 17.8 | 350 | - | - | - |
| 7370 | - | - | - | - | 0.5 | 10.6 | 680 |
| 7510 | 4310 | 13.2 | 17.7 | 345 | - | - | - |
| 7600 | 4280 | 13.2 | 17.7 | 345 | - | - | - |
| 8570 | 4430 | 13.2 | 17.7 | 345 | - | - | - |
| 8610 | - | - | - | - | 0.5 | 10.7 | 680 |
| 8695 | - | 13.4 | 17.8 | 350 | - | - | - |
| 10,099 | - | 13.8 | 17.8 | 345 | - | - | - |
| 14,637 | - | - | - | - | 0.6 | 10.4 | - |
| 14,654 | - | 16.0 | 17.9 | - | - | - | - |
| 14,671 | end | - | - | - | - | - | - |
| 15,748 | - | - | - | - | 0.7 | 10.4 | - |

# Holzhauser Ranch Spring-Flow Monitoring

A field investigation was conducted from August 12 to 20, 1997 to determine the effects of operation of Well 7A on the flow rates from two springs on the Holzhauser Ranch. The investigation was initiated in response to an urgent request from DFG to address complaints that flow in these springs rapidly diminishes or dries up when Well 7A is operating. This was reportedly a particular problem during the spring 1997 aquifer performance test of Well 7A.

The Holzhauser Ranch is approximately 4.5 miles north-northwest of Well 7A, and the springs are along the east side of Sam's Neck at the base of the volcanic ridge that bounds the valley. **Figure 9** shows the general Holzhauser Ranch location in relation to the overall study area. Numerous springs in the area emerge along faults that impede the flow of groundwater. The effect of the blockage is a buildup of groundwater behind the faults, causing springs.

The two Holzhauser springs are about 0.4 miles apart. The North Spring (47N/02W-09A02MS) discharges into a pond that is about 120 feet by 60 feet, and the South Spring (47N/02W-09H02MS) flows into a U-shaped pond that is about 450 feet by 100 feet. The main Holzhauser Ranch is north of the springs and has a domestic well at the house and two irrigation wells that are about 300 and 2,100 feet north of the North Spring.

To evaluate spring-flow response to operation of Well 7A, criteria for field data collection were:

- Obtain pre-test spring-flow data and groundwater levels for selected wells in the upper Meiss Lake and Sam's Neck areas (scheduled to occur during the brief, no-extraction period of the August hay cutting to determine background flow rates and groundwater levels)
- Obtain spring-flow data during this no-extraction period, with only Well 7A operating, to monitor the effects of operation of Well 7A on the flow in the springs
- Obtain spring-flow data during the recovery portion of the test, to determine spring-flow recovery rates

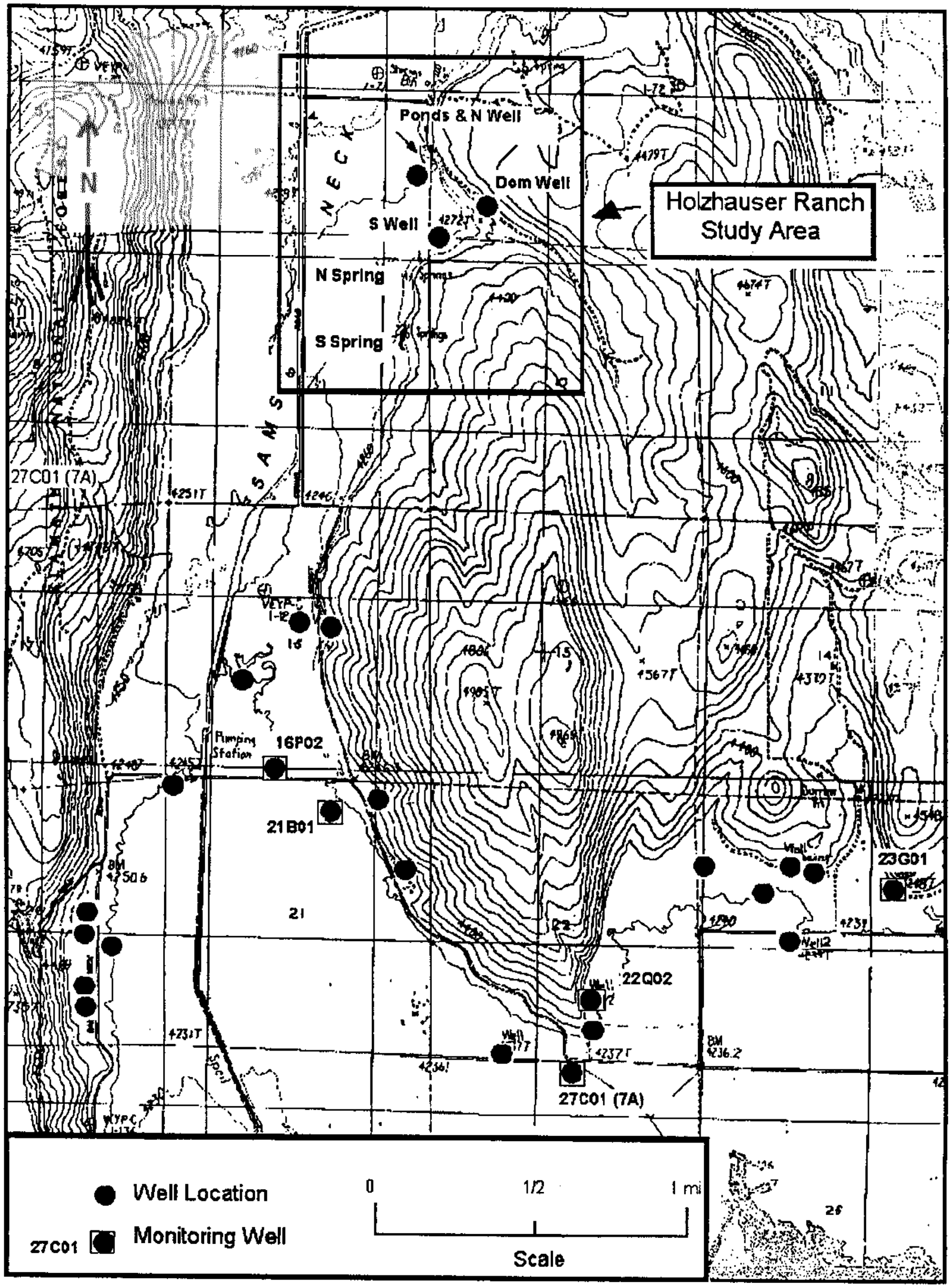



Figure 9. Holzhauser Ranch Location Map

## Pre-Test

To measure the flow at each of the springs, headboxes, constructed from plywood and PVC fittings, were installed at both springs to contain the outflow. The headbox at the North Spring was installed at the outflow of the spring pond, because the spring has several diffuse sources, some of which probably originate at the pond bottom. The headbox at the South Spring was installed very close to the source, upstream of the pond about 10 feet from the spring. Once the installations were completed, background values for spring-flow, specific conductance, and temperature were collected at both springs. These data are summarized in **Tables 4** and **5**. Spring-flows were determined using calibrated containers that were filled over timed intervals.

Two other ponds on the Holzhauser Ranch are about 2,200 feet north of the North Spring. These ponds, which are used for storage, are supplied by precipitation, other nearby subsurface springs or seeps, and some groundwater pumped from the north irrigation well. The northernmost of these ponds is roughly 350 feet long and about 180 feet wide. The second pond is slightly smaller and is about 80-90 feet south of the other pond. To monitor changes in the north storage pond, a reinforcement bar reference point was installed to serve as a pond stage datum.

A pre-test groundwater level was measured in Well 7A on August 13. Other wells on the special local well grid were also measured at this time. Due to intermittent pumping and poor measurement access, water levels were not monitored for the Holzhauser Ranch wells. Both irrigation wells pumped several hours on the first two days of the test, and possibly intermittently through the end of the test.

## Test

Well 7A was turned on mid-afternoon on August 13 and ran for over five days. The flow was estimated at about 2,800–3,000 gpm. Groundwater levels, specific conductance, and temperature were measured periodically through the end of the test and recovery.

Before the end of the test, wells on the local monitoring grid were remeasured to determine the local drawdowns. Some of these wells were operating during the test; therefore, some of the groundwater levels reflect drawdowns. Well 21B01 was operating prior to the initial measurement and continued, at least during the daylight hours, through the final measurements. The resulting drawdowns relative to the elapsed test duration and distances from Well 7A are summarized in **Table 4**.

Table 4. **Groundwater Levels and Quality – Holzhauser Ranch Spring Monitoring**

| Well Number | Status | Distance from Well 7A in feet | Drawdown in feet* | Elapsed Time Well 7A, minutes** |
|---|---|---|---|---|
| 47N-2W-16P02 | Idle | 7,930 | 3.4 | 5893 |
| 47N-2W-21B01 | Idle to operating | 6.260 | 15.0 | 5905 |
| 47N-2W-22Q02 | Idle | 820 | 15.1 | 5952 |
| 47N-2W-23G01 | Operating daily | 7,320 | 11.1 | 5974 |
| 47N-2W-27C01 (7A) | Idle to operating | Zero | 27.5 | 6023 |

*For period of August 13–18; ** Since test started at Well 7A

## Recovery

Well 7A was turned off in the late evening on August 18 and recovery began. The total elapsed test time for operating Well 7A was 7,483 minutes, or 5.2 days. Recovery measurements for Well 7A are summarized in **Table 5**.

During recovery, measurements of spring-flow, conductivity, and temperature were made at the North and South springs. These data are summarized in **Tables 6** and **7**. Late evening on August 19, one day into recovery, a rainstorm began. The storm lasted about 12 hours, through most of the test recovery measurements. A total of 1.03 inches of precipitation was recorded at the nearby Juanita Lake station. That precipitation was similar to measurements recorded at the Holzhauser Ranch. This precipitation probably affected recovery measurements, particularly for the ponds.

## Storage Ponds

Other than some moist areas near seeps, the smaller pond was dry through the test period. **Table 8** summarizes the stage measurements made at the north pond during the test and into recovery. Following the test, the water level at the north pond had dropped about 0.19 feet below the original water level. Precipitation, and/or post-test recovery of spring-flow, raised the water level in the north pond by 0.11 foot.

### Table 5. Groundwater Levels and Quality—Well 7A

| Date (1997) | Well 7A Status | Time | Elapsed Test Time (min.) * | Specific Conductance (μmhos/cm) | Field Temperature (°C) | Water Level (feet) |
|---|---|---|---|---|---|---|
| 8-13 | Idle | 0815 | — | — | — | 31.7 |
| 8-13 | Idle | 1510 | — | — | — | 32.6 |
| 8-13 | Operating | 1533 | 13 | — | 18.6 | — |
| 8-14 | Operating | 1030 | 1150 | — | 18.3 | 41.8 |
| 8-14 | Operating | 1710 | 1550 | — | 18.7 | 42.1 |
| 8-18 | Operating | 1953 | 7463 | 365 | 17.7 | 59.2 |
| 8-18 | Shut Down | 2004 | 7484 (0) | — | — | 59.2 |
| 8-19 | Recovery | 1919 | 8879 (1395) | — | — | 46.6 |
| 8-20 | Recovery | 1035 | 9795 (2311) | — | — | 38.7 |

* Parentheses indicate elapsed time of recovery.

### Table 6. Groundwater Quality and Spring-Flow—North Spring

| Date (1997) | Well 7A Status | Time | Elapsed Test Time (min.) | Flow (gpm) | Specific Conductance (μmhos/cm) | Temperature (°C) |
|---|---|---|---|---|---|---|
| 8-13 | Idle | 1253 | N/A | 14.3 | — | 22.1 |
| 8-13 | Operating | 1647 | 87 | 14.3 | — | 23.0 |
| 8-14 | Operating | 1401 | 1361 | 13.9 | — | 22.4 |
| 8-18 | Operating | 1540 | 7220 | 13.1 | 181 | 22.2 |
| 8-19 | Recovery | 1215 | 8455 | 12.7 | 184 | 20.0 |
| 8-20 | Recovery | 1205 | 9885 | 17.3 * | 174 | 18.1 |

* About 1 inch of precipitation fell between the last two measurements.

**Table 7. Groundwater Quality and Spring-Flow—South Spring**

| Date (1997) | Well 7A Status | Time | Elapsed Test Time (min.) | Flow (gpm) | Specific Conductance (µmhos/cm) | Field Temperature (°C) |
|---|---|---|---|---|---|---|
| 8-13 | Idle | 1210 | n/a | 4.1 | — | 13.3 |
| 8-13 | Operating | 1713 | 113 | 4.1 | — | 12.9 |
| 8-14 | Operating | 1435 | 1395 | 4.0 | — | 13.6 |
| 8-18 | Operating | 1626 | 7266 | 3.7 | 152 | 12.3 |
| 8-19 | Recovery | 1254 | 8494 | 3.7 | 153 | 12.2 |
| 8-20 | Recovery | 1303 | 9943 | 3.7 | 154 | 12.2 |

**Table 8. Stage Measurements—North Pond**

| Date (1997) | Time | Well 7A Operation Status | Water Level Below Datum (ft.) |
|---|---|---|---|
| 8-12 | 1804 | Idle | 0.0 |
| 8-13 | 1549 | Operating | 0.0 |
| 8-14 | 1100 | Operating | 0.04 |
| 8-18 | 1350 | Operating | 0.19 |
| 8-19 | 1048 | Recovery | 0.19 |
| 8-19 | 1325 | Recovery | 0.19 |
| 8-20 | 1057 | Recovery | 0.08 (rain) |

## Discussion of Spring-Flow Monitoring and Operational Impacts

### Groundwater Level Changes and Water Quality Changes

During the five-day test, the maximum drawdown in Well 7A was 27.5 feet. Drawdowns in other wells monitored during the test were variable, depending on their operational status and distance from Well 7A.

Specific conductance and temperature monitoring for Well 7A was indeterminate. Analysis and comparison of the water quality parameters from the springs and Well 7A indicate that sources may be separate.

### North Spring Pond Flow

Spring-flow measurements at the North Spring show that flows decreased from 14.3 gpm to 13.1 gpm by the end of the five-day test. It appears that groundwater extraction in the area contributed to a spring-flow decrease of about 1.6 gpm (11 percent) from the North Spring pond. Because at least three other nearby wells were operating during the test, the separate impact of operation of Well 7A is not known. Following the test, about one day into recovery, the spring-flow was 12.7 gpm, which may be the result of renewed and/or continued operation of other nearby wells. The rainfall that occurred the second day of recovery seems to have recharged the spring and/or pond storage, because the flow rate increased to 17.3 gpm.

### South Spring Flow

Spring-flow measurements at the South Spring show that flows decreased from 4.1 gpm, to 3.7 gpm by the end of the five-day test and remained at that rate throughout the first day of recovery. The 0.4 gpm (10 percent) decrease in flow from the South Spring was also probably due to area groundwater extraction. However, because other nearby wells were operating during the test, and the spring-flow rate did not begin to recover when the test was completed, it is clear that other wells influence the flow in the South Spring. Because the flow rate in this spring did not increase as a result of the precipitation that occurred during recovery, it appears that the recharge to the North Spring was not an increase in spring-flow, but more likely due to precipitation added to the pond outflow.

### Storage Ponds

The south storage pond remained dry throughout the test. The water level at the north storage pond dropped 0.19 feet over the five-day test. The owner indicated that no groundwater was delivered to the pond during the test. Using evaporation loss values for the Tule Lake CIMIS Station (#91), evaporation losses from the ponds are estimated to be about 0.02 feet/day. Therefore, other than evaporation possibly accounting for about one half of the drop in stage, little else can be inferred from test data. Inflow from any subsurface seeps or springs could not be observed or measured. Also, infiltration losses are unknown.

### Water Temperatures

Temperature measurements made during the test show that Well 7A temperatures ranged from 17.7 to 18.7 °C. The North Spring temperatures were much warmer and generally reflect the effects of warming from the pond. As such, they are useless for analysis. The South Spring temperatures were much colder, ranging from 12.2 to 13.6 °C. These differences in temperatures seem to indicate different sources for the springs and Well 7A.

### Specific Conductance

The EC data collected during the test indicate that the specific conductance values for the springs were similar. The spring specific conductance values were considerably lower than those measured in Well 7A. This could also suggest separate water sources for the springs and Well 7A.

### Conclusions

Spring-flow monitoring of the five-day test of Well 7A indicates that area groundwater extraction reduces the flow from the two Holzhauser Ranch springs. However, the flow reductions cannot be totally attributed to Well 7A operations, because other nearby wells were operating during the test. Recovery monitoring indicates that even without Well 7A operating, the flows in the South Spring did not recover, indicating other influences affecting spring-flow. The slight differences in thermal and specific conductance properties suggest that Well 7A and the springs have different sources, but the sparse data are not totally conclusive.

# Bibliography


**California Department of Health Services**. Unpublished water quality data. 1995.

**California Department of Water Resources**. *Ground Water Conditions in Central and Northern California 1957-58.* Bulletin 77-58. October 1958.

_______. *Northeastern Counties Investigation.* Bulletin 58. June 1960.

_______. *Northeastern Counties Ground Water Investigation.* Bulletin 98, Volumes I and II. February 1963.

_______. *Klamath River Basin Investigation.* Bulletin 83. July 1964.

_______. *Quality of Ground Water in California 1961-2, Part 1: Northern and Central California.* Bulletin 66-62. August 1964.

_______. *Dorris-Butte Valley Water Quality Investigation.* Northern District Office Report. March 1968.

_______. *Water Management for Wildlife Enhancement in Butte Valley.* Bulletin 105-4. November 1973.

_______. *California's Ground Water.* Bulletin 118. September 1975.

_______. *Ground Water Basins in California.* Bulletin 118-80. January 1980.

_______. *Butte Valley Aquifer Test.* Northern District Office Memorandum. August 1993.

_______. *Normalized 1990 Land and Water Use Data for Northern District's Portion of Bulletin 160-93.* Northern District Memorandum Report. May 1994.

______. *California Water Plan Update.* Bulletin 160-93, Volumes 1 & 2. October 1994.

**Hotchkiss W.R.** *A Geologic and Hydrologic Reconnaissance of Lava Beds National Monument, California.* U.S. Geological Survey Open-File Report. August 1968.

**Illian, J.R.** *Interim Report on the Ground Water in the Klamath Basin.* Oregon State Engineer. 1970.

**King, G.** "Late Quaternary Paleolakes of Butte Valley, Siskiyou County, California." *California Geographer*, Vol. XXXIV, pp. 41-56. 1994.

**Leonard, A.R. and A.P. Harris**. *Ground Water in Selected Areas in the Klamath Basin*. Oregon State Engineer Ground Water Report No. 21, 104p. 1974.

**Lohman, S.** *Ground-Water Hydraulics*. U.S. Geological Survey Prof. Paper 708. 70p. 1972.

**Newcomb, R.C. and D.H. Hart** *Preliminary Report on the Groundwater Resources of the Klamath River Basin, Oregon*. U.S. Geological Survey Open-File Report. 1958.

**Novick, K.** *Butte Valley Wildlife Area Management Plan*. California Department of Fish and Game. June 1996.

**Planert, M. and J.S. Williams**. "Ground Water Atlas of the United States - Segment 1 California Nevada. " *Hydrologic Investigations Atlas 730-B*. U.S. Geological Survey <http://water.wr.usgs.gov/gwatlas/index.html> 1995.

**Rantz, S.E.** *Mean Annual Precipitation in the California Region*. U.S. Geological Survey Basic-Data Compilation. 1969.

**Staton, K.L.** *Geology and Geomorphology of Butte Valley, California*. Graduate Research Monograph, California State University, Chico. 1996.

**U.S. Bureau of Reclamation**. Klamath Project, Butte Division, Butte Valley and Oklahoma Units, Oregon-California: Groundwater Geology and Resources Appendix. 1957.

_______. Butte Valley Division, Klamath Project Feasibility; Ground-Water Geology & Resources Appendix. October 1980.

_______. Butte Valley Division, Klamath Project Feasibility; Concluding Report. May 1981.

**Wood, P.R.** *Geology and Ground-Water Features of the Butte Valley Region - Siskiyou County, California*. USGS Water Supply Paper 1491. 1960.

# Appendix A
# State Well Numbering System

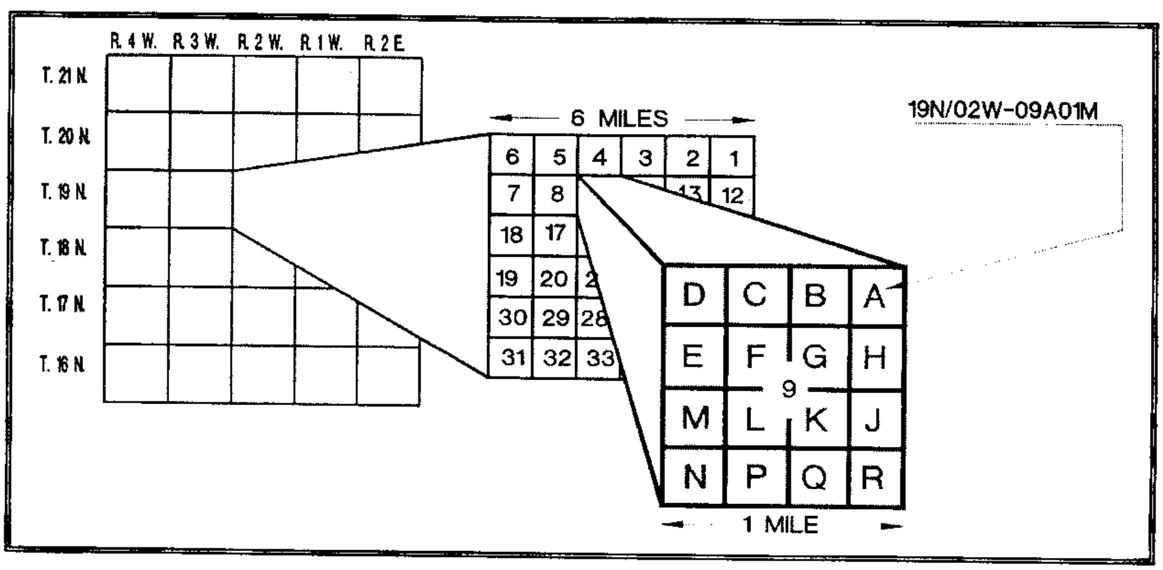
## State Well Numbering System

Each well in the monitoring program is assigned an official State Well Number. DWR has sole responsibility for assigning State Well Numbers to water wells in California, and each number uniquely identifies a well based on its location.

Each State Well Number includes township, range and section number, and each section is further subdivided into sixteen 40-acre tracts, which are assigned a letter designation as shown below. Within each 40-acre tract, wells are numbered sequentially in the order they are inventoried. The final letter of the identification signifies the base line and meridian to which the well location refers.

In the Sacramento Valley groundwater basin, all wells are referenced to the Mount Diablo base line and meridian. The example below is for State Well Number 19N/02W-09A01M.

**State Well Numbering System**




**The lettering system does not contain the letters "I" and "O"**

# Appendix B
# Butte Valley Well Elevations—GPS Survey

## Butte Valley Well Elevation – GPS Survey

In June 1996, horizontal and vertical coordinates were determined for ten wells within Butte Valley in Siskiyou County. Horizontal coordinates are provided in UTM Zone 10 (NAD-27-feet). The vertical datum used for this survey was NGVD 29.

Two highly precise Geodetic Network (HPGN) monuments were used for horizontal control for this survey. Two permanent monuments were established within the project area using static GPS occupation of approximately one hour. Both of these permanent control monuments already had known elevations. 8GWM952 is a USGS brass cap in a concrete base located just off Meiss Lake Road about 6.82 miles from Highway 97. C1 is a 3/4-inch galvanized pipe with a brass cap in concrete located on Meiss Lake Levee about 0.06 miles from Meiss Lake Road. Two more vertical control monuments were used: ML6 and RBC4204. **Figure B1** is a map of the entire network, and **Figure B2** is a detail of the central area.

Each reference monument was surveyed with a tripod using fast static GPS occupations. The reference monument was usually a 2-foot-long rebar driven flush with the concrete well pad. The horizontal and vertical coordinates of the reference monuments will be precise to plus or minus 0.2 feet. The reference monuments were placed as close as possible to the actual wells, but in some instances the RM is 20 feet or more from the well due to GPS signal obstructions. A level loop was surveyed to determine the elevation difference between the RM and the RP. An auto-level and fiberglass philadelphia rod were used to survey the level loop. A summary spreadsheet is provided that gives the well reference monument coordinates, RM elevation, RP elevation, and the distance from DFG Well 7A.

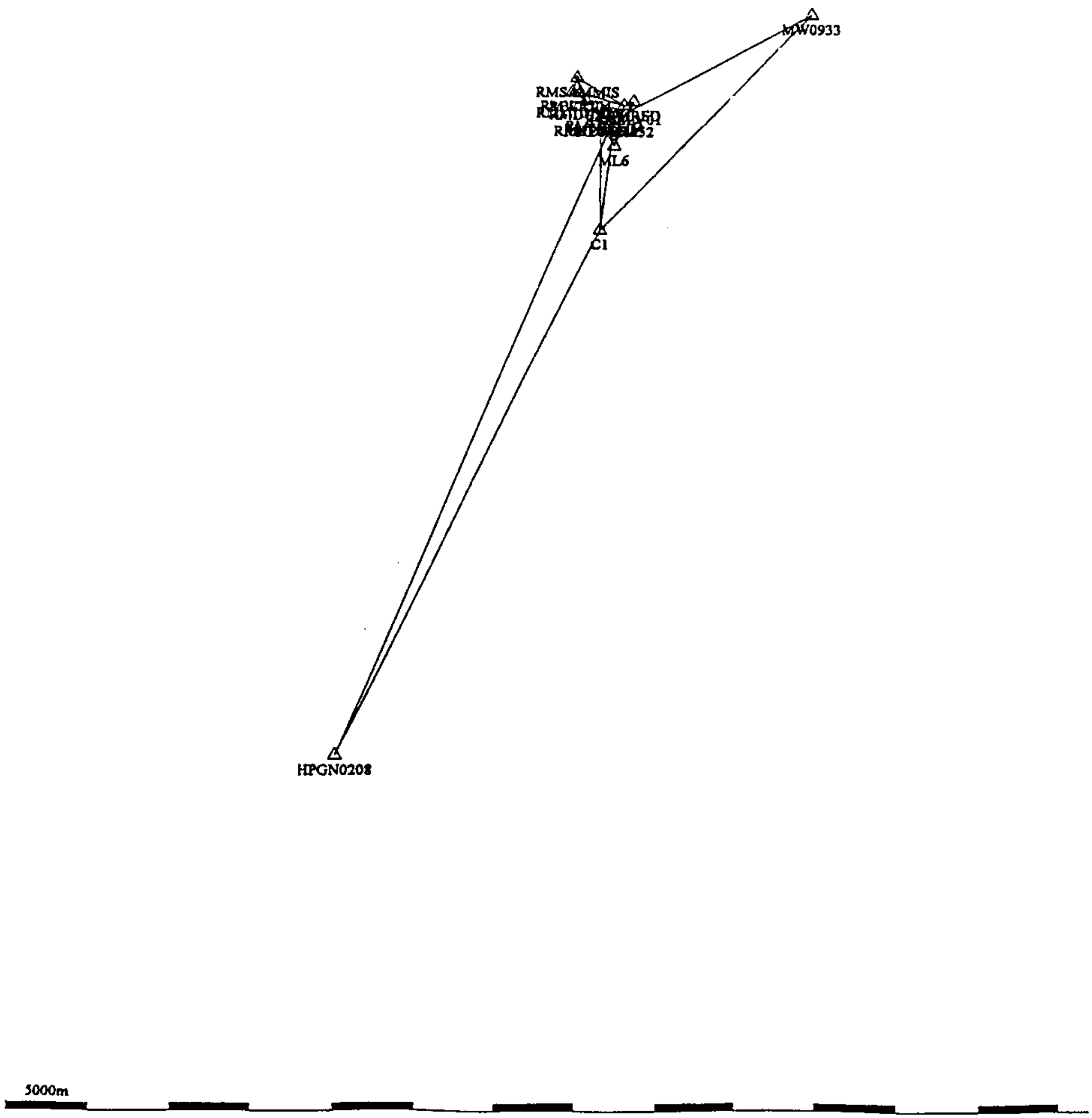



Figure B1. Network Map: Butte Valley Well Survey

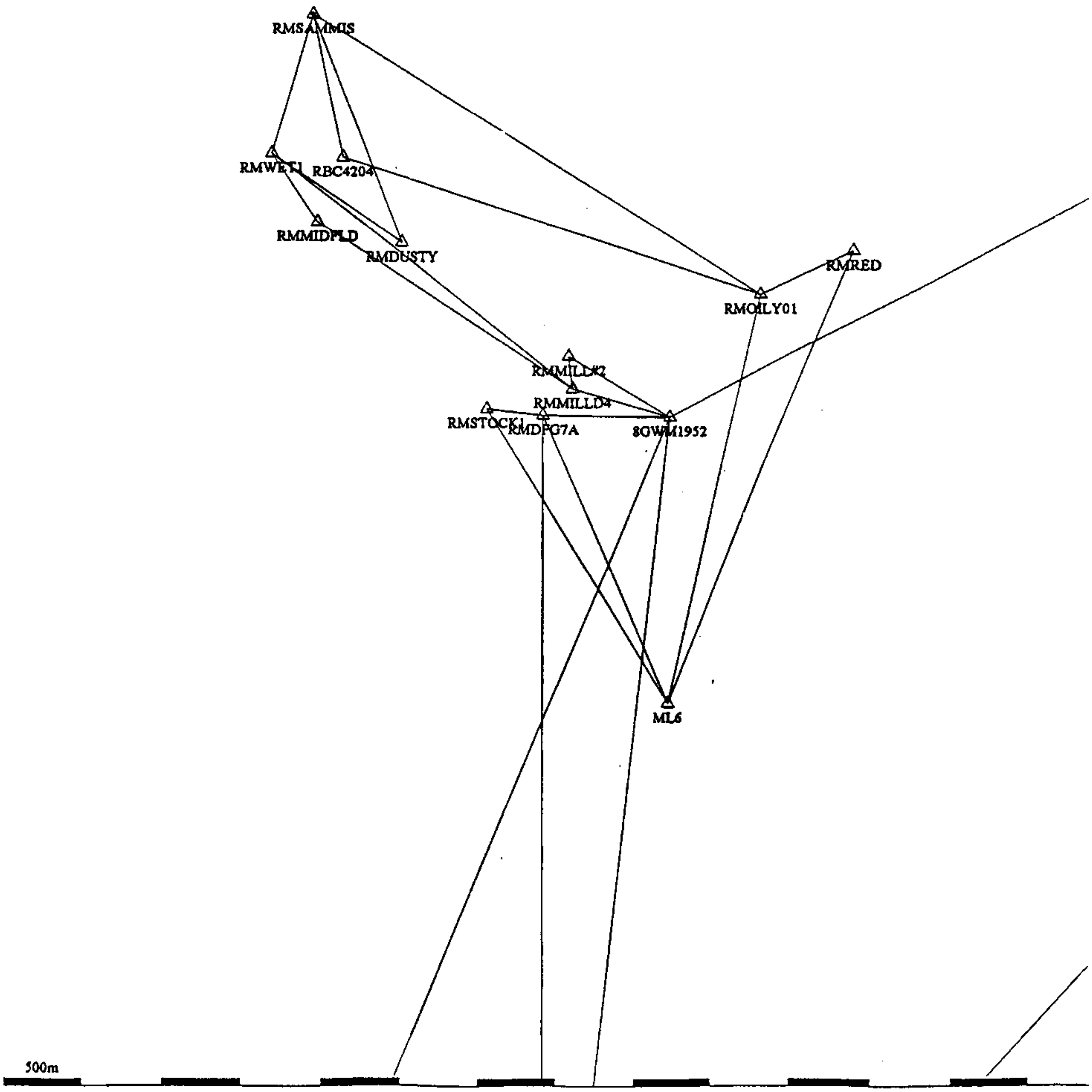



**Figure B2. Network Map: Butte Valley Well Survey (Detail)**

# Butte Valley GPS Well Survey Results

State Plane Coordinates in US Survey Feet.
Horizontal Datum = NAD 1927
Vertical Datum = NGVD 1929

| WELL NAME | NORTHING | EASTING | RM ELEVATION | RP ELEVATION | DELTA RP ELEV. | DELTA DIST. |
|---|---|---|---|---|---|---|
| RMDFG7A | 933205.89 | 1977699.50 | 4241.92 | 4241.4 | 0.0 | 0 |
| RMMILLD4 | 933763.82 | 1978297.81 | 4238.20 | 4238.8 | -2.6 | 818 |
| RMSTOCK1 | 933324.82 | 1976498.19 | 4236.44 | 4237.8 | -3.6 | 1,207 |
| RMMILL#2 | 934451.13 | 1978230.15 | 4242.62 | 4242.9 | 1.5 | 1,354 |
| RMDUSTY | 936829.41 | 1974682.15 | 4262.74 | 4259.7 | 18.3 | 4,715 |
| RMOILY01 | 935744.08 | 1982280.06 | 4239.77 | 4239.9 | -1.5 | 5,237 |
| RMMIDFLD | 937261.69 | 1972932.02 | 4239.10 | 4239.6 | -1.8 | 6,259 |
| RMRED | 936663.75 | 1984154.31 | 4247.53 | 4247.5 | 6.1 | 7,323 |
| RMWET1 | 938716.61 | 1971991.00 | 4240.31 | 4240.4 | -1.0 | 7,934 |
| RMSAMMIS | 941652.62 | 1972810.83 | 4245.93 | 4247.1 | 5.7 | 9,759 |
| | | | | | | |
| 8GWM1952 | 933164.73 | 1980384.30 | 4236.18 | CONTROL | | 2,685 |
| C1 | 909837.35 | 1977783.76 | 4239.19 | CONTROL | | 23,369 |
| HPGN0208 | 801179.67 | 1925023.58 | | CONTROL | | 142,147 |
| ML6 | 927182.64 | 1980346.17 | 4240.17 | CONTROL | | 6,579 |
| MW0933 | 954673.52 | 2020844.31 | | CONTROL | | 48,191 |
| RBC4204 | 938630.59 | 1973439.75 | 4247.21 | CONTROL | | 6,897 |

| | | | | | |
|---|---|---|---|---|---|
| 1 | 8GWM1952 | 4638292.912052<br>576980.519597 | 1268.5966<br>1291.1906 | ---h | YXHh |
| 2 | C1 | 4631176.705982<br>576270.887254 | 1269.4758<br>1292.1086 | ---h | YXHh |
| 3 | HPGN0208 | 4597885.448350<br>560579.362862 | 1153.4808<br>1176.3801 | YX-- | YXHh |
| 4 | ML6 | 4636470.267509<br>576990.111355 | 1269.7777<br>1292.4049 | ---h | YXHh |
| 5 | MW0933 | 4644989.569213<br>589230.673402 | 1270.2619<br>1292.6828 | YX-- | YXHh |
| 6 | RBC4204 | 4639933.515296<br>574845.421893 | 1271.9850<br>1294.5522 | ---h | YXHh |
| 7 | RMDFG7A | 4638295.934992<br>576162.422966 | 1270.3504<br>1292.9398 | ---- | YXHh |
| 8 | RMDUSTY | 4639389.176736<br>575230.315803 | 1276.7113<br>1299.2851 | ---- | YXHh |
| 9 | RMMIDFLD | 4639514.671130<br>574695.592124 | 1269.5100<br>1292.0797 | ---- | YXHh |
| 10 | RMMILL#2 | 4638677.190603<br>576319.674277 | 1270.5686<br>1293.1544 | ---- | YXHh |
| 11 | RMMILLD4 | 4638468.034536<br>576342.724889 | 1269.2167<br>1291.8049 | ---- | YXHh |
| 12 | RMOILY01 | 4639085.460854<br>577548.935517 | 1269.6939<br>1292.2835 | ---- | YXHh |
| 13 | RMRED | 4639372.294360<br>578116.681258 | 1272.0597<br>1294.6489 | ---- | YXHh |
| 14 | RMSAMMIS | 4640851.968346<br>574643.106101 | 1271.6048<br>1294.1622 | ---- | YXHh |
| 15 | RMSTOCK1 | 4638327.909118<br>575796.009883 | 1268.6816<br>1291.2687 | ---- | YXHh |
| 16 | RMWET1 | 4639954.588904<br>574403.745781 | 1269.8850<br>1292.4493 | ---- | YXHh |

SYSTEM PARAMETERS

Network status = reduced computed adjusted
Datum = NAD-27
Coordinate System = Universal Transverse Mercator
Zone = 10
Linear units = meter

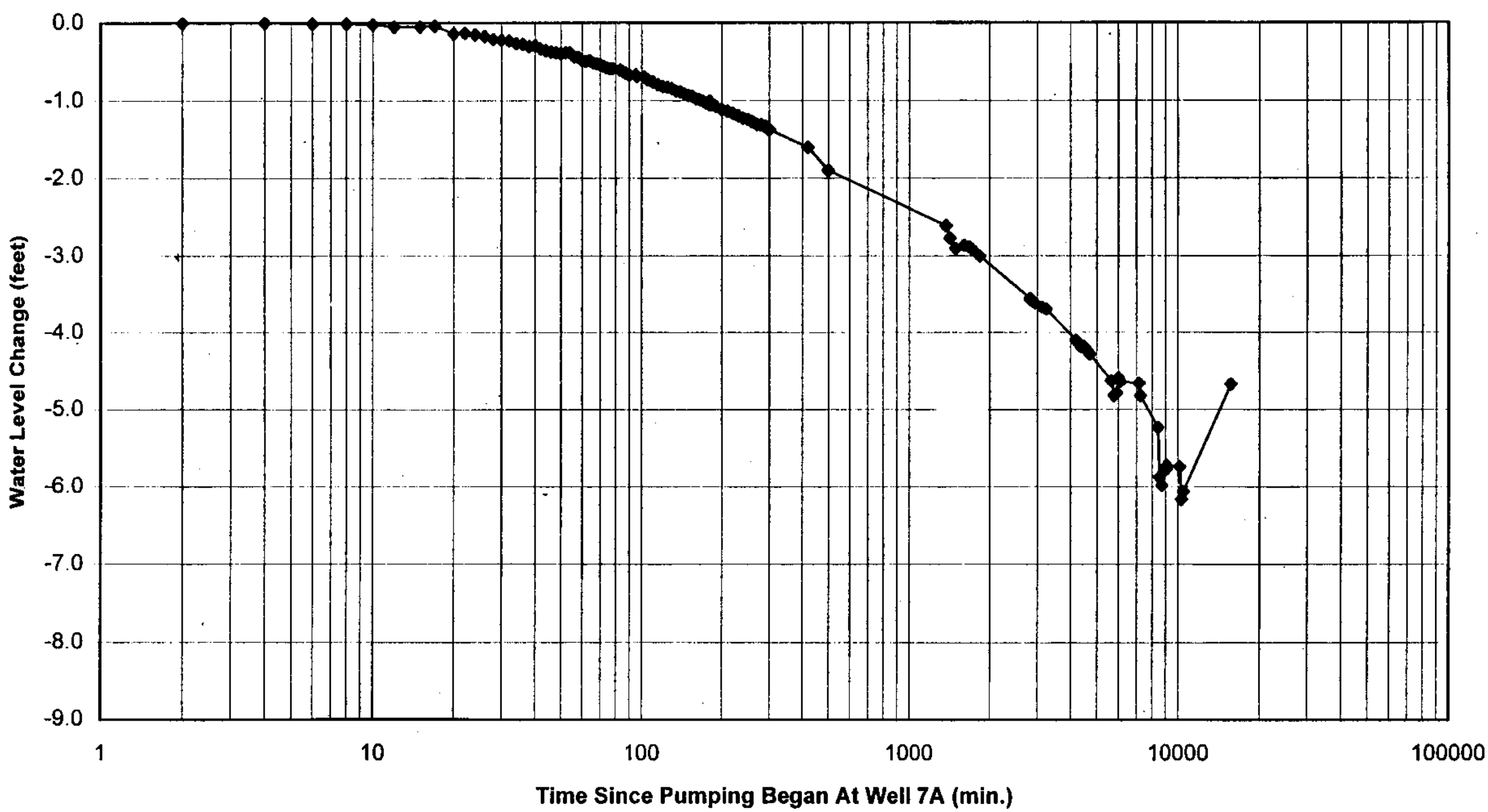
| | | | | | |
|---|---|---|---|---|---|
| 1 | 8GWM1952 | 933164.725723<br>1980384.301791 | 4162.0540<br>4236.1810 | ---h | YXHh |
| 2 | C1 | 909837.348584<br>1977783.757949 | 4164.9387<br>4239.1930 | ---h | YXHh |
| 3 | HPGN0208 | 801179.674687<br>1925023.580717 | 3784.3783<br>3859.5070 | YX-- | YXHh |
| 4 | ML6 | 927182.636395<br>1980346.174306 | 4165.9289<br>4240.1650 | ---h | YXHh |
| 5 | MW0933 | 954673.522346<br>2020844.314432 | 4167.5175<br>4241.0767 | YX-- | YXHh |
| 6 | RBC4204 | 938630.588003<br>1973439.747272 | 4173.1708<br>4247.2100 | ---h | YXHh |
| 7 | RMDFG7A | 933205.891329<br>1977699.503006 | 4167.8078<br>4241.9200 | ---- | YXHh |
| 8 | RMDUSTY | 936829.411446<br>1974682.154720 | 4188.6769<br>4262.7378 | ---- | YXHh |
| 9 | RMMIDFLD | 937261.692387<br>1972932.023663 | 4165.0507<br>4239.0982 | ---- | YXHh |
| 10 | RMMILL#2 | 934451.131561<br>1978230.147381 | 4168.5239<br>4242.6241 | ---- | YXHh |
| 11 | RMMILLD4 | 933763.820312<br>1978297.809413 | 4164.0884<br>4238.1965 | ---- | YXHh |
| 12 | RMOILY01 | 935744.079857<br>1982280.063761 | 4165.6541<br>4239.7668 | ---- | YXHh |
| 13 | RMRED | 936663.746472<br>1984154.310850 | 4173.4160<br>4247.5273 | ---- | YXHh |
| 14 | RMSAMMIS | 941652.617399<br>1972810.833428 | 4171.9233<br>4245.9304 | ---- | YXHh |
| 15 | RMSTOCK1 | 933324.819415<br>1976498.190134 | 4162.3330<br>4236.4374 | ---- | YXHh |
| 16 | RMWET1 | 938716.614933<br>1971991.001119 | 4166.2810<br>4240.3108 | ---- | YXHh |

SYSTEM PARAMETERS

Network status = reduced computed adjusted
Datum = NAD-27
Coordinate System = 1927 State Plane Lambert
Zone = California Zone 1
Linear units = US Survey Foot

# Appendix C
# 1997 Aquifer Performance Test Data

Miller West Irrigation Well(16P02) Water Level Change
Aquifer Test of
29 April 1997 - 9 May 1997



## AQUIFER TEST DATA

OWNER: Miller Irr / West (by road) ADDRESS: SAM'S NECK RD, MACDOEL COUNTY: SISKIYOU STATE: CA
DATE: 04/29-.5/9/97 ORGANIZATION PERFORMING TEST: DWR MEASURED BY: SI/JMA/KYB/JVG/SS
WELL NO.: 47N-2W-16P02 DISTANCE FROM PUMPING WELL 7934 TEST TYPE PUMP/DRAWDOWN
MEASURING EQUIPMENT: STEEL TAPE TEST I.D. OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 21.52 RP - WS | HOW Q MEASURED | |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 | HOURS | | R.P. ELEV: | 4240.4 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

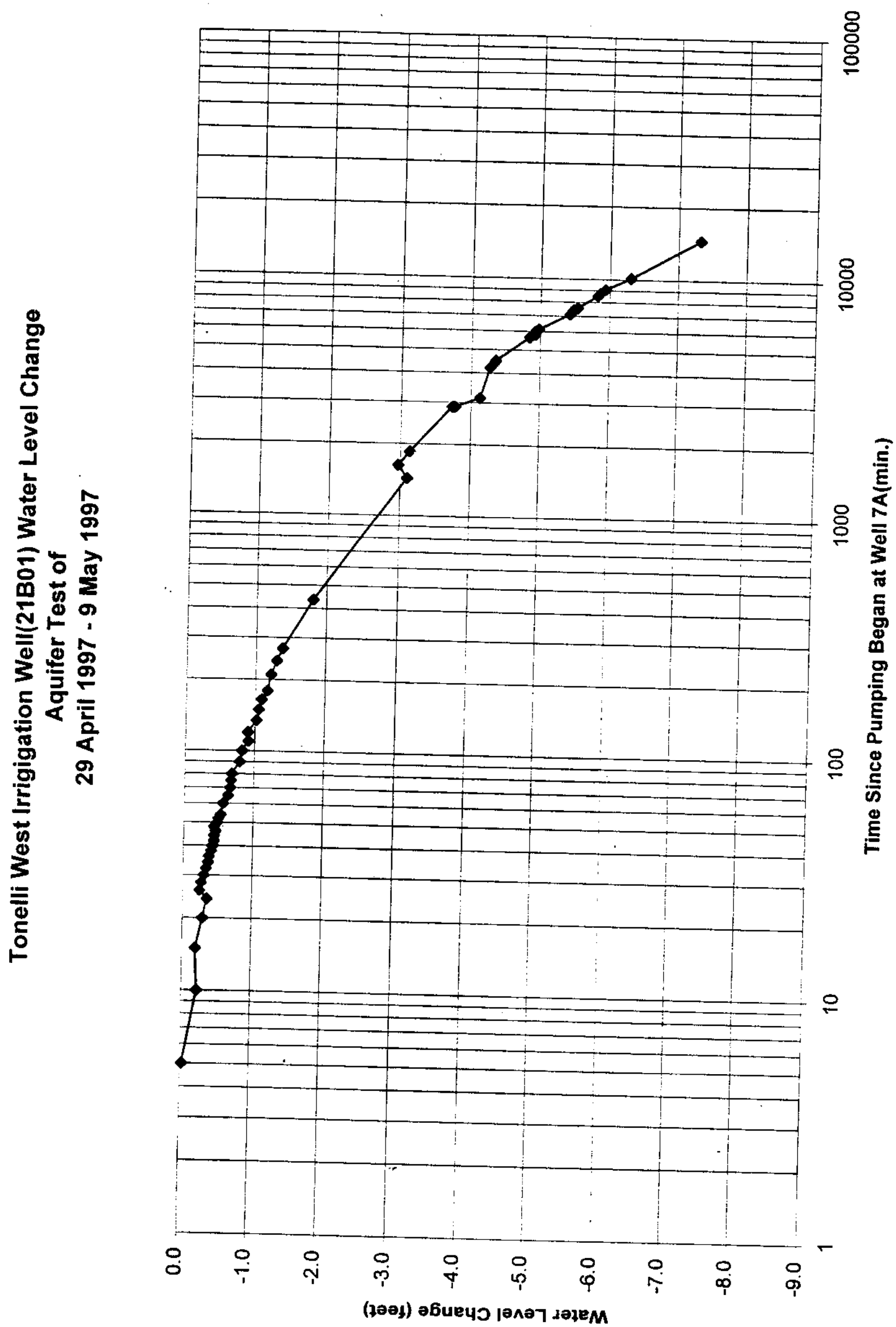
| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE DISCHARGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 28 | 97 | 15 | 40 | | | | 21.07 | | | | | Sandy Irving |
| 4 | 29 | 97 | 9 | 35 | | | | 21.11 | | | | | |
| 4 | 29 | 97 | 10 | 16 | | | | 21.14 | | | | | |
| 4 | 29 | 97 | 11 | 04 | | | | 21.16 | | | | | |
| 4 | 29 | 97 | 11 | 07 | | | | 21.11 | | | | | Tape hang up at 14', |
| 4 | 29 | 97 | 11 | 21 | | | | 21.54 | | | | | changed RP |
| 4 | 29 | 97 | 11 | 22 | | | | 21.53 | | | | | |
| 4 | 29 | 97 | 11 | 26 | | | | 21.53 | | | | | |
| 4 | 29 | 97 | 11 | 28 | | | | 21.52 | | | | | |
| 4 | 29 | 97 | 11 | 29 | | | | 21.52 | | | | | |
| 4 | 29 | 97 | 11 | 30 | 0 | | | 21.51 | -0.01 | | | | PUMP ON, t=0 |
| 4 | 29 | 97 | 11 | 32 | 2 | | | 21.52 | 0.00 | | | | |
| 4 | 29 | 97 | 11 | 34 | 4 | | | 21.52 | 0.00 | | | | |
| 4 | 29 | 97 | 11 | 36 | 6 | | | 21.53 | 0.01 | | | | |
| 4 | 29 | 97 | 11 | 38 | 8 | | | 21.53 | 0.01 | | | | |
| 4 | 29 | 97 | 11 | 40 | 10 | | | 21.54 | 0.02 | | | | Tape hang up |
| 4 | 29 | 97 | 11 | 42 | 12 | | | 21.57 | 0.05 | | | | Tape hang up |
| 4 | 29 | 97 | 11 | 45 | 15 | | | 21.57 | 0.05 | | | | Tape hang up |
| 4 | 29 | 97 | 11 | 47 | 17 | | | 21.56 | 0.04 | | | | Tape hang up |
| 4 | 29 | 97 | 11 | 50 | 20 | | | 21.66 | 0.14 | | | | Tape hang up |
| 4 | 29 | 97 | 11 | 52 | 22 | | | 21.65 | 0.13 | | | | Tape hang up |
| 4 | 29 | 97 | 11 | 54 | 24 | | | 21.67 | 0.15 | | | | Tape hang up |
| 4 | 29 | 97 | 11 | 56 | 26 | | | 21.69 | 0.17 | | | | Tape hang up |
| 4 | 29 | 97 | 11 | 58 | 28 | | | 21.73 | 0.21 | | | | Tape hang up |
| 4 | 29 | 97 | 12 | 00 | 30 | | | 21.74 | 0.22 | | | | |
| 4 | 29 | 97 | 12 | 02 | 32 | | | 21.75 | 0.23 | | | | |
| 4 | 29 | 97 | 12 | 04 | 34 | | | 21.78 | 0.26 | | | | |
| 4 | 29 | 97 | 12 | 06 | 36 | | | 21.79 | 0.27 | | | | |
| 4 | 29 | 97 | 12 | 08 | 38 | | | 21.82 | 0.30 | | | | |
| 4 | 29 | 97 | 12 | 10 | 40 | | | 21.81 | 0.29 | | | | |
| 4 | 29 | 97 | 12 | 12 | 42 | | | 21.85 | 0.33 | | | | |
| 4 | 29 | 97 | 12 | 14 | 44 | | | 21.87 | 0.35 | | | | |
| 4 | 29 | 97 | 12 | 16 | 46 | | | 21.89 | 0.37 | | | | |
| 4 | 29 | 97 | 12 | 18 | 48 | | | 21.90 | 0.38 | | | | |
| 4 | 29 | 97 | 12 | 20 | 50 | | | 21.91 | 0.39 | | | | |
| 4 | 29 | 97 | 12 | 22 | 52 | | | 21.90 | 0.38 | | | | |
| 4 | 29 | 97 | 12 | 24 | 54 | | | 21.90 | 0.38 | | | | |
| 4 | 29 | 97 | 12 | 26 | 56 | | | 21.95 | 0.43 | | | | |
| 4 | 29 | 97 | 12 | 28 | 58 | | | 21.96 | 0.44 | | | | |
| 4 | 29 | 97 | 12 | 30 | 60 | | | 22.00 | 0.48 | | | | |
| 4 | 29 | 97 | 12 | 32 | 62 | | | 22.01 | 0.49 | | | | |
| 4 | 29 | 97 | 12 | 34 | 64 | | | 22.00 | 0.48 | | | | |
| 4 | 29 | 97 | 12 | 36 | 66 | | | 22.03 | 0.51 | | | | |
| 4 | 29 | 97 | 12 | 38 | 68 | | | 22.04 | 0.52 | | | | |
| 4 | 29 | 97 | 12 | 40 | 70 | | | 22.05 | 0.53 | | | | |
| 4 | 29 | 97 | 12 | 42 | 72 | | | 22.07 | 0.55 | | | | |
| 4 | 29 | 97 | 12 | 44 | 74 | | | 22.09 | 0.57 | | | | |
| 4 | 29 | 97 | 12 | 46 | 76 | | | 22.10 | 0.58 | | | | |
| 4 | 29 | 97 | 12 | 48 | 78 | | | 22.10 | 0.58 | | | | |
| 4 | 29 | 97 | 12 | 53 | 83 | | | 22.12 | 0.60 | | | | |
| 4 | 29 | 97 | 12 | 55 | 85 | | | 22.14 | 0.62 | | | | |
| 4 | 29 | 97 | 12 | 57 | 87 | | | 22.16 | 0.64 | | | | |
| 4 | 29 | 97 | 13 | 00 | 90 | | | 22.18 | 0.66 | | | | |
| 4 | 29 | 97 | 13 | 05 | 95 | | | 22.18 | 0.66 | | | | |
| 4 | 29 | 97 | 13 | 06 | 96 | | | 22.20 | 0.68 | | | | |
| 4 | 29 | 97 | 13 | 12 | 102 | | | 22.21 | 0.69 | | | | |
| 4 | 29 | 97 | 13 | 15 | 105 | | | 22.24 | 0.72 | | | | |
| 4 | 29 | 97 | 13 | 20 | 110 | | | 22.27 | 0.75 | | | | Electric Meter 70,881 |
| 4 | 29 | 97 | 13 | 25 | 115 | | | 22.31 | 0.79 | | | | |
| 4 | 29 | 97 | 13 | 30 | 120 | | | 22.33 | 0.81 | | | | |
| 4 | 29 | 97 | 13 | 35 | 125 | | | 22.34 | 0.82 | | | | |
| 4 | 29 | 97 | 13 | 40 | 130 | | | 22.36 | 0.84 | | | | |
| 4 | 29 | 97 | 13 | 45 | 135 | | | 22.39 | 0.87 | | | | |

# AQUIFER TEST DATA

OWNER: Miller Irr / West (by road) ADDRESS: SAM'S NECK RD, MACDOEL COUNTY: SISKIYOU STATE: CA
DATE: 04/29-.5/9/97 ORGANIZATION PERFORMING TEST: DWR MEASURED BY: SI/JMA/KYB/JVG/SS
WELL NO.: 47N-2W-16P02 DISTANCE FROM PUMPING WELL 7934 TEST TYPE PUMP/DRAWDOWN
MEASURING EQUIPMENT: STEEL TAPE TEST I.D. OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 21.52 RP - WS | HOW Q MEASURED | |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 | HOURS | | R.P. ELEV: | 4240.4 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE DISCHARGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 29 | 97 | 13 | 50 | 140 | | | 22.40 | 0.88 | | | | |
| 4 | 29 | 97 | 13 | 55 | 145 | | | 22.43 | 0.91 | | | | Bob Tonelli Here |
| 4 | 29 | 97 | 14 | 00 | 150 | | | 22.45 | 0.93 | | | | |
| 4 | 29 | 97 | 14 | 05 | 155 | | | 22.46 | 0.94 | | | | |
| 4 | 29 | 97 | 14 | 10 | 160 | | | 22.49 | 0.97 | | | | |
| 4 | 29 | 97 | 14 | 15 | 165 | | | 22.50 | 0.98 | | | | |
| 4 | 29 | 97 | 14 | 20 | 170 | | | 22.52 | 1.00 | | | | |
| 4 | 29 | 97 | 14 | 25 | 175 | | | 22.55 | 1.03 | | | | |
| 4 | 29 | 97 | 14 | 30 | 180 | | | 22.52 | 1.00 | | | | |
| 4 | 29 | 97 | 14 | 31 | 181 | | | 22.57 | 1.05 | | | | |
| 4 | 29 | 97 | 14 | 40 | 190 | | | 22.59 | 1.07 | | | | |
| 4 | 29 | 97 | 14 | 50 | 200 | | | 22.63 | 1.11 | | | | |
| 4 | 29 | 97 | 15 | 00 | 210 | | | 22.65 | 1.13 | | | | |
| 4 | 29 | 97 | 15 | 10 | 220 | | | 22.68 | 1.16 | | | | |
| 4 | 29 | 97 | 15 | 20 | 230 | | | 22.71 | 1.19 | | | | |
| 4 | 29 | 97 | 15 | 30 | 240 | | | 22.74 | 1.22 | | | | |
| 4 | 29 | 97 | 15 | 40 | 250 | | | 22.76 | 1.24 | | | | |
| 4 | 29 | 97 | 15 | 50 | 260 | | | 22.79 | 1.27 | | | | |
| 4 | 29 | 97 | 16 | 00 | 270 | | | 22.82 | 1.30 | | | | |
| 4 | 29 | 97 | 16 | 10 | 280 | | | 22.83 | 1.31 | | | | |
| 4 | 29 | 97 | 16 | 20 | 290 | | | 22.85 | 1.33 | | | | JMA here (Jon Anderson) |
| 4 | 29 | 97 | 16 | 30 | 300 | | | 22.89 | 1.37 | | | | |
| 4 | 29 | 97 | 18 | 30 | 420 | | | 23.12 | 1.60 | | | | JMA |
| 4 | 29 | 97 | 19 | 50 | 500 | | | 23.42 | 1.90 | | | | JMA |
| 4 | 30 | 97 | 10 | 28 | 1378 | | | 24.13 | 2.61 | | | | JMA |
| 4 | 30 | 97 | 11 | 16 | 1426 | | | 24.29 | 2.77 | | | | JMA |
| 4 | 30 | 97 | 12 | 29 | 1499 | | | 24.42 | 2.90 | | | | JMA, windy |
| 4 | 30 | 97 | 14 | 20 | 1610 | | | 24.38 | 2.86 | | | | JMA |
| 4 | 30 | 97 | 15 | 30 | 1680 | | | 24.40 | 2.88 | | | | JMA |
| 4 | 30 | 97 | 16 | 10 | 1720 | | | 24.43 | 2.91 | | | | JMA |
| 4 | 30 | 97 | 18 | 10 | 1840 | | | 24.52 | 3.00 | | | | JMA, windy |
| 5 | 1 | 97 | 10 | 36 | 2826 | | | 25.07 | 3.55 | | | | JMA, calm |
| 5 | 1 | 97 | 10 | 52 | 2842 | | | 25.09 | 3.57 | | | | |
| 5 | 1 | 97 | 12 | 39 | 2949 | | | 25.13 | 3.61 | | | | SS (Steve Sunding) |
| 5 | 1 | 97 | 15 | 43 | 3133 | | | 25.18 | 3.66 | | | | SS |
| 5 | 1 | 97 | 17 | 48 | 3258 | | | 25.21 | 3.69 | | | | SS |
| 5 | 2 | 97 | 9 | 15 | 4185 | | | 25.62 | 4.10 | | | | SS, calm |
| 5 | 2 | 97 | 10 | 53 | 4283 | | | 25.66 | 4.14 | | | | SS, cloudy |
| 5 | 2 | 97 | 12 | 39 | 4389 | | | 25.71 | 4.19 | | | | SS, cloudy |
| 5 | 2 | 97 | 14 | 15 | 4485 | | | 25.70 | 4.18 | | | | SS, cloudy |
| 5 | 2 | 97 | 16 | 18 | 4608 | | | 25.75 | 4.23 | | | | SS, breezy |
| 5 | 2 | 97 | 18 | 00 | 4710 | | | 25.80 | 4.28 | | | | SS, breezy |
| 5 | 3 | 97 | 9 | 45 | 5655 | | | 26.15 | 4.63 | | | | SS, breezy |
| 5 | 3 | 97 | 12 | 00 | 5790 | | | 26.34 | 4.82 | | | | SS, breezy |
| 5 | 3 | 97 | 14 | 06 | 5916 | | | 26.31 | 4.79 | | | | |
| 5 | 3 | 97 | 15 | 50 | 6020 | | | 26.11 | 4.59 | | | | |
| 5 | 3 | 97 | 17 | 30 | 6120 | | | 26.16 | 4.64 | | | | JVG, breezy |
| 5 | 4 | 97 | 10 | 55 | 7165 | | | 26.18 | 4.66 | | | | JVG, sprinkling |
| 5 | 4 | 97 | 12 | 30 | 7260 | | | 26.34 | 4.82 | | | | JVG, sunny |
| 5 | 4 | 97 | 15 | 00 | 7410 | | | 26.75 | 5.23 | | | | (Jeff Van Gilder) |
| 5 | 5 | 97 | 9 | 45 | 8535 | | | 27.39 | 5.87 | | | | |
| 5 | 5 | 97 | 12 | 45 | 8715 | | | 27.50 | 5.98 | | | | |
| 5 | 5 | 97 | 18 | 55 | 9085 | | | 27.29 | 5.77 | | | | |
| 5 | 5 | 97 | 19 | 02 | 9092 | | | 27.25 | 5.73 | | | | JMA/KYB (Koll Buer) |
| 5 | 5 | 97 | 19 | 06 | 9096 | | | 27.24 | 5.72 | | | | JMA/KYB |
| 5 | 6 | 97 | 13 | 00 | 10170 | | | 27.26 | 5.74 | | | | KYB, pmp base to cas. |
| 5 | 6 | 97 | 15 | 19 | 10309 | | | 27.68 | 6.16 | | | | KYB |
| 5 | 6 | 97 | 17 | 54 | 10464 | | | 27.58 | 6.06 | | | | |
| 5 | 9 | 97 | 11 | 30 | 14400 | | | | | | | | PUMP OFF, t'=0 |
| 5 | 10 | 97 | 9 | 49 | 15739 | 1068 | 15 | 26.18 | 4.66 | | | | KYB |
| | | | | | | | | | | | | | Far Well, North, near road clean, blue booster by Alfalfa Field, a |


Tonelli West Irrigigation Well(21B01) Water Level Change
Aquifer Test of
29 April 1997 - 9 May 1997
Water Level Change (feet)
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-8.0
-9.0
Time Since Pumping Began at Well 7A(min.)
1
10
100
1000
10000
100000

# AQUIFER TEST DATA

OWNER: Tonelli Irr / West Field  ADDRESS: SAM'S NECK ROAD, MACDOEL  COUNTY: SISKIYOU  STATE: CA
DATE: 04/29-05/9/97  ORGANIZATION PERFORMING TEST: DWR  MEASURED BY: JMA/SS/JVG/KYB
WELL NO.: 47N-02W-21B01  DISTANCE FROM PUMPING WELL 6259  TEST TYPE PUMP/DRAWDOWN
MEASURING EQUIPMENT: STEEL TAPE  TEST I.D.  OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 18.46 RP - WS | HOW Q MEASURED | N/A |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 HOURS | | | R.P. ELEV: | 4239.6 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 28 | 97 | 17 | 50 | | | | 19.03 | | | | | oily, Jon Anderson |
| 4 | 29 | 97 | 09 | 50 | | | | 18.54 | | | | | In middle of Alfalfa field |
| 4 | 29 | 97 | 09 | 58 | | | | 18.52 | | | | | |
| 4 | 29 | 97 | 11 | 15 | | | | 18.46 | | | | | |
| 4 | 29 | 97 | 11 | 30 | 0 | | | 18.46 | 0.00 | | | | PUMP ON, Jeff |
| 4 | 29 | 97 | 11 | 35 | 5 | | | 18.48 | 0.02 | | | | Van Gilder |
| 4 | 29 | 97 | 11 | 40 | 10 | | | 18.68 | 0.22 | | | | |
| 4 | 29 | 97 | 11 | 45 | 15 | | | 18.65 | 0.19 | | | | |
| 4 | 29 | 97 | 11 | 50 | 20 | | | 18.75 | 0.29 | | | | |
| 4 | 29 | 97 | 11 | 54 | 24 | | | 18.81 | 0.35 | | | | |
| 4 | 29 | 97 | 11 | 56 | 26 | | | 18.70 | 0.24 | | | | |
| 4 | 29 | 97 | 11 | 58 | 28 | | | 18.72 | 0.26 | | | | |
| 4 | 29 | 97 | 12 | 00 | 30 | | | 18.76 | 0.30 | | | | |
| 4 | 29 | 97 | 12 | 02 | 32 | | | 18.79 | 0.33 | | | | |
| 4 | 29 | 97 | 12 | 04 | 34 | | | 18.82 | 0.36 | | | | |
| 4 | 29 | 97 | 12 | 06 | 36 | | | 18.83 | 0.37 | | | | |
| 4 | 29 | 97 | 12 | 08 | 38 | | | 18.86 | 0.40 | | | | |
| 4 | 29 | 97 | 12 | 10 | 40 | | | 18.88 | 0.42 | | | | |
| 4 | 29 | 97 | 12 | 12 | 42 | | | 18.90 | 0.44 | | | | |
| 4 | 29 | 97 | 12 | 14 | 44 | | | 18.90 | 0.44 | | | | |
| 4 | 29 | 97 | 12 | 16 | 46 | | | 18.92 | 0.46 | | | | |
| 4 | 29 | 97 | 12 | 18 | 48 | | | 18.90 | 0.44 | | | | |
| 4 | 29 | 97 | 12 | 20 | 50 | | | 18.94 | 0.48 | | | | |
| 4 | 29 | 97 | 12 | 22 | 52 | | | 18.96 | 0.50 | | | | |
| 4 | 29 | 97 | 12 | 24 | 54 | | | 18.99 | 0.53 | | | | |
| 4 | 29 | 97 | 12 | 30 | 60 | | | 19.02 | 0.56 | | | | |
| 4 | 29 | 97 | 12 | 35 | 65 | | | 19.09 | 0.63 | | | | |
| 4 | 29 | 97 | 12 | 40 | 70 | | | 19.12 | 0.66 | | | | |
| 4 | 29 | 97 | 12 | 45 | 75 | | | 19.13 | 0.67 | | | | |
| 4 | 29 | 97 | 12 | 50 | 80 | | | 19.14 | 0.68 | | | | |
| 4 | 29 | 97 | 13 | 00 | 90 | | | 19.25 | 0.79 | | | | |
| 4 | 29 | 97 | 13 | 10 | 100 | | | 19.28 | 0.82 | | | | |
| 4 | 29 | 97 | 13 | 20 | 110 | | | 19.37 | 0.91 | | | | |
| 4 | 29 | 97 | 13 | 30 | 120 | | | 19.36 | 0.90 | | | | |
| 4 | 29 | 97 | 13 | 45 | 135 | | | 19.48 | 1.02 | | | | |
| 4 | 29 | 97 | 14 | 00 | 150 | | | 19.51 | 1.05 | | | | |
| 4 | 29 | 97 | 14 | 15 | 165 | | | 19.55 | 1.09 | | | | |
| 4 | 29 | 97 | 14 | 30 | 180 | | | 19.63 | 1.17 | | | | |
| 4 | 29 | 97 | 15 | 00 | 210 | | | 19.68 | 1.22 | | | | |
| 4 | 29 | 97 | 15 | 30 | 240 | | | 19.76 | 1.30 | | | | |
| 4 | 29 | 97 | 16 | 00 | 270 | | | 19.84 | 1.38 | | | | |
| 4 | 29 | 97 | 18 | 45 | 435 | | | 20.27 | 1.81 | | | | JMA |
| 4 | 30 | 97 | 11 | 28 | 1438 | | | 21.56 | 3.10 | | | | |
| 4 | 30 | 97 | 14 | 37 | 1627 | | | 21.43 | 2.97 | | | | very windy |
| 4 | 30 | 97 | 18 | 25 | 1855 | | | 21.59 | 3.13 | | | | very windy |
| 5 | 1 | 97 | 11 | 21 | 2871 | | | 22.19 | 3.73 | | | | calm, Steve Sunding |
| 5 | 1 | 97 | 11 | 24 | 2874 | | | 22.23 | 3.77 | | | | |
| 5 | 1 | 97 | 11 | 27 | 2877 | | | 22.21 | 3.75 | | | | |
| 5 | 1 | 97 | 15 | 58 | 3148 | | | 22.59 | 4.13 | | | | |
| 5 | 2 | 97 | 09 | 38 | 4208 | | | 22.73 | 4.27 | | | | calm |
| 5 | 2 | 97 | 13 | 00 | 4410 | | | 22.79 | 4.33 | | | | cloudy |
| 5 | 2 | 97 | 14 | 38 | 4508 | | | 22.81 | 4.35 | | | | breezy |
| 5 | 3 | 97 | 10 | 00 | 5670 | | | 23.30 | 4.84 | | | | breezy |
| 5 | 3 | 97 | 12 | 30 | 5820 | | | 23.38 | 4.92 | | | | breezy |
| 5 | 3 | 97 | 15 | 45 | 6015 | | | 23.39 | 4.93 | | | | breezy, JVG |
| 5 | 3 | 97 | 17 | 40 | 6130 | | | 23.43 | 4.97 | | | | |
| 5 | 4 | 97 | 10 | 00 | 7110 | | | 23.88 | 5.42 | | | | sunny/breezy |
| 5 | 4 | 97 | 13 | 30 | 7320 | | | 23.92 | 5.46 | | | | sunny |
| 5 | 4 | 97 | 15 | 20 | 7430 | | | 23.93 | 5.47 | | | | |
| 5 | 4 | 97 | 17 | 35 | 7565 | | | 23.99 | 5.53 | | | | |

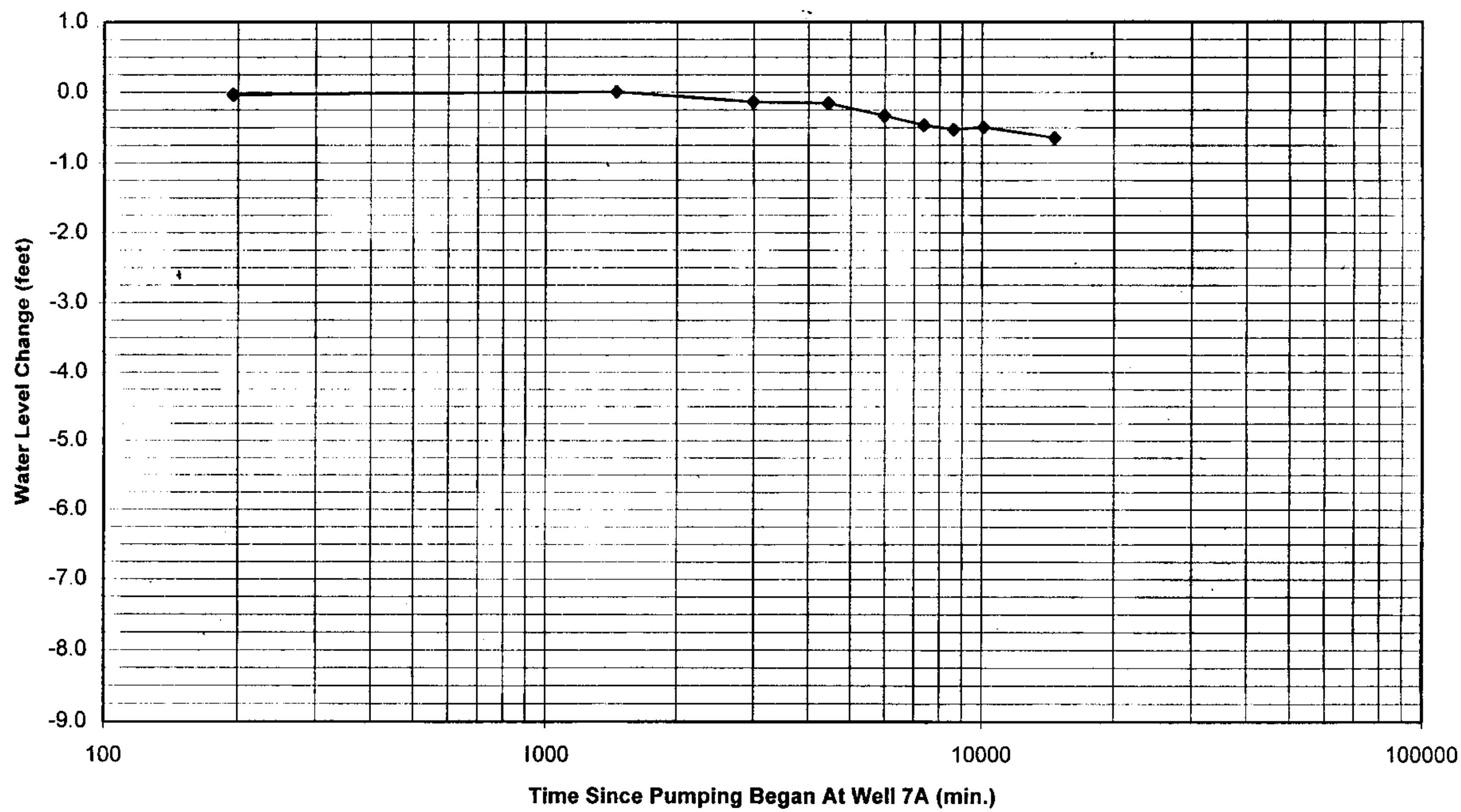
## AQUIFER TEST DATA

OWNER: Tonelli Irr / West Field ADDRESS: SAM'S NECK ROAD, MACDOEL COUNTY: SISKIYOU STATE: CA
DATE: 04/29-05/9/97 ORGANIZATION PERFORMING TEST: DWR MEASURED BY: JMA/SS/JVG/KYB
WELL NO.: 47N-02W-21B01 DISTANCE FROM PUMPING WELL 6259 TEST TYPE PUMP/DRAWDOWN
MEASURING EQUIPMENT: STEEL TAPE TEST I.D. OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 18.46 RP - WS | HOW Q MEASURED | N/A |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 HOURS | | | R.P. ELEV: | 4239.6 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 | 97 | 09 | 30 | 8520 | | | 24.28 | 5.82 | | | | |
| 5 | 5 | 97 | 13 | 00 | 8730 | | | 24.31 | 5.85 | | | | |
| 5 | 5 | 97 | 18 | 46 | 9076 | | | 24.39 | 5.93 | | | | sunny, Koll Buer |
| 5 | 6 | 97 | 12 | 36 | 10146 | | | 24.76 | 6.30 | | | | |
| 5 | 9 | 97 | 15 | 01 | 14611 | | | 25.78 | 7.32 | | | | PUMP OFF |
| 5 | 9 | 97 | 17 | 46 | 14776 | 105 | 141 | 25.03 | 6.57 | | | | |
| 5 | 10 | 97 | 09 | 38 | 15728 | 1057 | 15 | 23.63 | 5.17 | | | | |

## Cavener Stock Well(22P01) Water Level Change
## Aquifer Test of
## 29 April 1997 - 9 May 1997



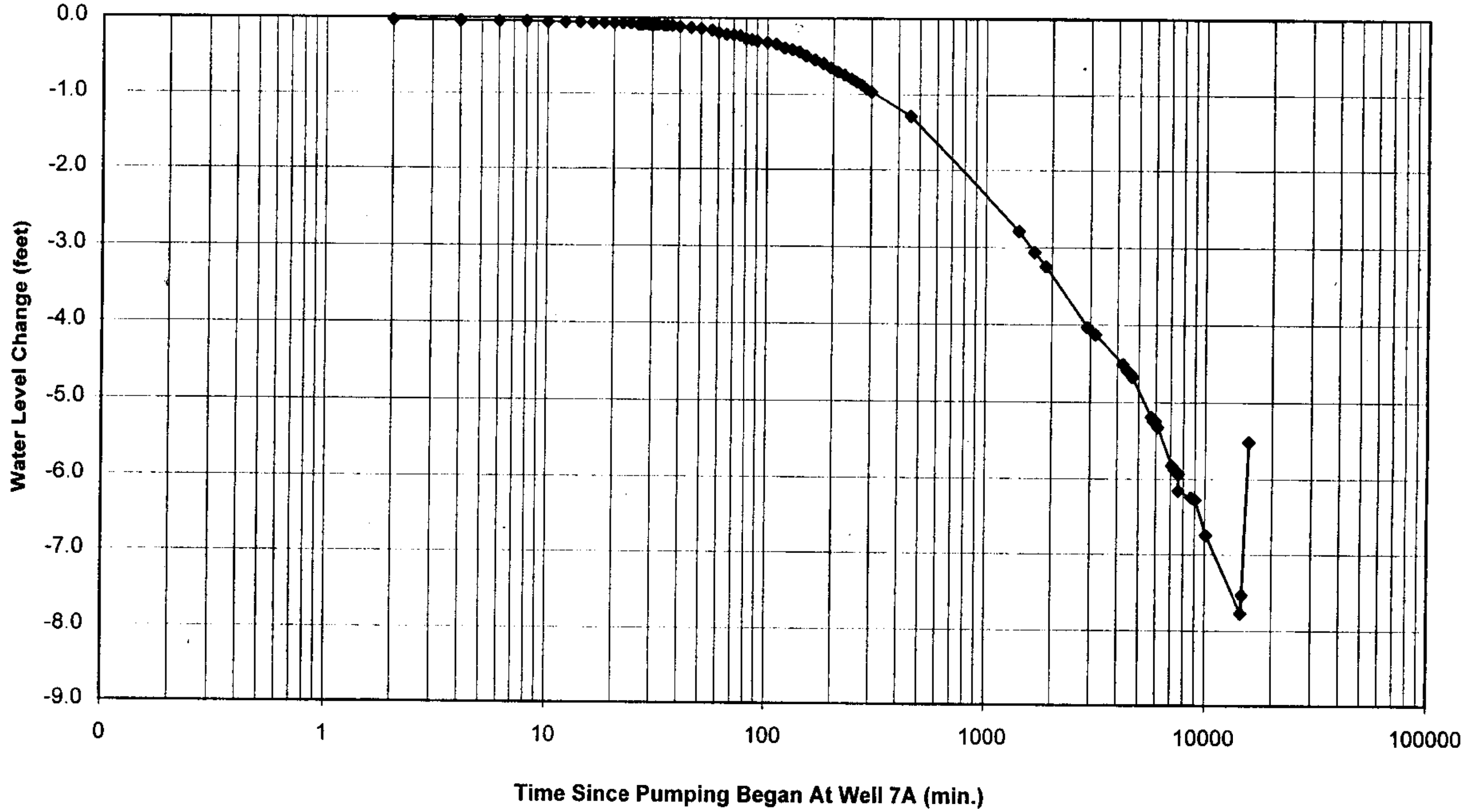
## AQUIFER TEST DATA

OWNER: Cavener - Stock Well ADDRESS: SAM'S NECK RD, MACDOEL COUNTY: SISKIYOU STATE: CA
DATE: 04/29-05/09/97 ORGANIZATION PERFORMING TEST: DWR MEASURED BY: KYB, JMA, SS, JVG
WELL NO.: 47N-2W-22P01 DISTANCE FROM PUMPING WELL 1207 FT TEST TYPE PUMP/DRAWDOWN
MEASURING EQUIPMENT: SOLINST SOUNDER TEST I.D. OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 7.28 RP-WS | HOW Q MEASURED | |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 HOURS | | | R.P. ELEV: | 4237.8 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 28 | 97 | 16 | 10 | | | | 7.28 | 0.00 | | ~8 | | JMA, 10.4°C, EC=645 |
| 4 | 29 | 97 | 14 | 45 | 195 | | | 7.31 | 0.03 | | | | Temp=10.6°C, EC=640, |
| 4 | 30 | 97 | 11 | 45 | 1455 | | | 7.27 | -0.01 | | | | Temp=10.6°C, EC=665 |
| 5 | 1 | 97 | 13 | 23 | 2993 | | | 7.41 | 0.13 | | | | SS, 10.4°C, EC=700 |
| 5 | 2 | 97 | 11 | 53 | | | | Bull Guarding Water Tank | | | | | 10.2°C, EC=680 |
| 5 | 2 | 97 | 13 | 30 | 4440 | | | 7.43 | 0.15 | | | | |
| 5 | 3 | 97 | 15 | 16 | 5986 | | | 7.61 | 0.33 | | | | EC=680, 10.8°C, pmpng |
| 5 | 4 | 97 | 14 | 20 | 7370 | | | 7.74 | 0.46 | | | | JVG, 10.6°C, EC=681 |
| 5 | 5 | 97 | 11 | 00 | 8610 | | | 7.80 | 0.52 | | | | pmpng, 10.7°C, EC=680 |
| 5 | 6 | 97 | 11 | 42 | 10092 | | | 7.77 | 0.49 | | | | well not pumping, KYB |
| 5 | 9 | 97 | 15 | 27 | 14637 | | | 7.92 | 0.64 | | | | well not pumping |
| 5 | 10 | 97 | 09 | 58 | 15748 | | | 8.00 | 0.72 | | | | not pumping, Koll Buer 10.4°C, EC=520(?) |

Miller Domestic(Well 22Q01) Water Level Change
Aquifer Test of
29 April 1997 - 9 May 1997



## AQUIFER TEST DATA

| | | | | | |
|---|---|---|---|---|---|
| OWNER: | Miller Domestic | ADDRESS: | SAM'S NECK RD. MACDOEL | COUNTY: | SISKIYOU STATE: CA |
| DATE: | 04/29-05/09/97 | ORGANIZATION PERFORMING TEST: | DWR | MEASURED BY: | PH/JMA/SS/JVG/KYB |
| WELL NO.: | 47N-2W-22Q01 | DISTANCE FROM PUMPING WELL | 818 | TEST TYPE | PUMP/DRAWDOWN |
| MEASURING EQUIPMENT: | Sounder DWR #97716 | | | TEST I.D. | OBSERVATION WELL |

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 19.28 RP - WS | HOW Q MEASURED | N/A |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 HOURS | | | R.P. ELEV: | 4238.6 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 28 | 97 | 18 | 42 | | | | 19.13 | -0.15 | | | | Rowlett Well pumping |
| 4 | 29 | 97 | 09 | 17 | | | | 19.23 | -0.05 | | | | Pat Huckabay |
| 4 | 29 | 97 | 11 | 14 | | | | 19.28 | 0.00 | | | | sounder and tape |
| 4 | 29 | 97 | 11 | 20 | | | | 19.28 | 0.00 | | | | measure the same |
| 4 | 29 | 97 | 11 | 24 | | | | 19.28 | 0.00 | | | | |
| 4 | 29 | 97 | 11 | 26 | | | | 19.29 | 0.01 | | | | |
| 4 | 29 | 97 | 11 | 28 | | | | 19.29 | 0.01 | | | | |
| 4 | 29 | 97 | 11 | 30 | 0 | | | 19.29 | 0.01 | | | | PUMP ON, t=0 |
| 4 | 29 | 97 | 11 | 32 | 2 | | | 19.31 | 0.03 | | | | |
| 4 | 29 | 97 | 11 | 34 | 4 | | | 19.32 | 0.04 | | | | |
| 4 | 29 | 97 | 11 | 36 | 6 | | | 19.33 | 0.05 | | | | |
| 4 | 29 | 97 | 11 | 38 | 8 | | | 19.33 | 0.05 | | | | |
| 4 | 29 | 97 | 11 | 40 | 10 | | | 19.34 | 0.06 | | | | |
| 4 | 29 | 97 | 11 | 42 | 12 | | | 19.34 | 0.06 | | | | |
| 4 | 29 | 97 | 11 | 44 | 14 | | | 19.34 | 0.06 | | | | |
| 4 | 29 | 97 | 11 | 46 | 16 | | | 19.35 | 0.06 | | | | |
| 4 | 29 | 97 | 11 | 48 | 18 | | | 19.35 | 0.06 | | | | |
| 4 | 29 | 97 | 11 | 50 | 20 | | | 19.35 | 0.07 | | | | |
| 4 | 29 | 97 | 11 | 52 | 22 | | | 19.35 | 0.07 | | | | |
| 4 | 29 | 97 | 11 | 54 | 24 | | | 19.35 | 0.07 | | | | |
| 4 | 29 | 97 | 11 | 56 | 26 | | | 19.37 | 0.09 | | | | |
| 4 | 29 | 97 | 11 | 57 | 27 | | | 19.37 | 0.09 | | | | |
| 4 | 29 | 97 | 11 | 58 | 28 | | | 19.36 | 0.08 | | | | |
| 4 | 29 | 97 | 11 | 59 | 29 | | | 19.37 | 0.09 | | | | |
| 4 | 29 | 97 | 12 | 00 | 30 | | | 19.38 | 0.10 | | | | |
| 4 | 29 | 97 | 12 | 01 | 31 | | | 19.37 | 0.09 | | | | |
| 4 | 29 | 97 | 12 | 02 | 32 | | | 19.37 | 0.09 | | | | |
| 4 | 29 | 97 | 12 | 04 | 34 | | | 19.38 | 0.10 | | | | |
| 4 | 29 | 97 | 12 | 05 | 35 | | | 19.38 | 0.10 | | | | |
| 4 | 29 | 97 | 12 | 07 | 37 | | | 19.38 | 0.10 | | | | |
| 4 | 29 | 97 | 12 | 10 | 40 | | | 19.39 | 0.11 | | | | |
| 4 | 29 | 97 | 12 | 15 | 45 | | | 19.41 | 0.13 | | | | |
| 4 | 29 | 97 | 12 | 20 | 50 | | | 19.42 | 0.14 | | | | |
| 4 | 29 | 97 | 12 | 26 | 56 | | | 19.44 | 0.16 | | | | |
| 4 | 29 | 97 | 12 | 30 | 60 | | | 19.47 | 0.19 | | | | |
| 4 | 29 | 97 | 12 | 35 | 65 | | | 19.49 | 0.21 | | | | |
| 4 | 29 | 97 | 12 | 40 | 70 | | | 19.50 | 0.22 | | | | |
| 4 | 29 | 97 | 12 | 45 | 75 | | | 19.51 | 0.23 | | | | |
| 4 | 29 | 97 | 12 | 50 | 80 | | | 19.55 | 0.27 | | | | |
| 4 | 29 | 97 | 12 | 55 | 85 | | | 19.56 | 0.28 | | | | |
| 4 | 29 | 97 | 13 | 00 | 90 | | | 19.58 | 0.30 | | | | |
| 4 | 29 | 97 | 13 | 10 | 100 | | | 19.60 | 0.32 | | | | |
| 4 | 29 | 97 | 13 | 20 | 110 | | | 19.62 | 0.34 | | | | |
| 4 | 29 | 97 | 13 | 30 | 120 | | | 19.67 | 0.39 | | | | |
| 4 | 29 | 97 | 13 | 40 | 130 | | | 19.69 | 0.41 | | | | |
| 4 | 29 | 97 | 13 | 50 | 140 | | | 19.72 | 0.44 | | | | |
| 4 | 29 | 97 | 14 | 00 | 150 | | | 19.77 | 0.49 | | | | |
| 4 | 29 | 97 | 14 | 15 | 165 | | | 19.82 | 0.54 | | | | |
| 4 | 29 | 97 | 14 | 30 | 180 | | | 19.87 | 0.59 | | | | |
| 4 | 29 | 97 | 14 | 45 | 195 | | | 19.93 | 0.65 | | | | |
| 4 | 29 | 97 | 15 | 00 | 210 | | | 19.98 | 0.70 | | | | |
| 4 | 29 | 97 | 15 | 15 | 225 | | | 20.02 | 0.74 | | | | |
| 4 | 29 | 97 | 15 | 32 | 242 | | | 20.07 | 0.79 | | | | |
| 4 | 29 | 97 | 15 | 45 | 255 | | | 20.11 | 0.83 | | | | |
| 4 | 29 | 97 | 16 | 00 | 270 | | | 20.15 | 0.87 | | | | |
| 4 | 29 | 97 | 16 | 15 | 285 | | | 20.21 | 0.93 | | | | |
| 4 | 29 | 97 | 16 | 30 | 300 | | | 20.24 | 0.96 | | | | |
| 4 | 29 | 97 | 19 | 05 | 455 | | | 20.56 | 1.28 | | | | Jon Anderson |
| 4 | 30 | 97 | 11 | 05 | 1415 | | | 22.07 | 2.79 | | | | |
| 4 | 30 | 97 | 15 | 17 | 1667 | | | 22.34 | 3.06 | | | | |
| 4 | 30 | 97 | 18 | 47 | 1877 | | | 22.52 | 3.24 | | | | |

## AQUIFER TEST DATA

OWNER: Miller Domestic — ADDRESS: SAM'S NECK RD, MACDOEL — COUNTY: SISKIYOU — STATE: CA

DATE: 04/29-05/09/97 — ORGANIZATION PERFORMING TEST: DWR — MEASURED BY: PH/JMA/SS/JVG/KYB

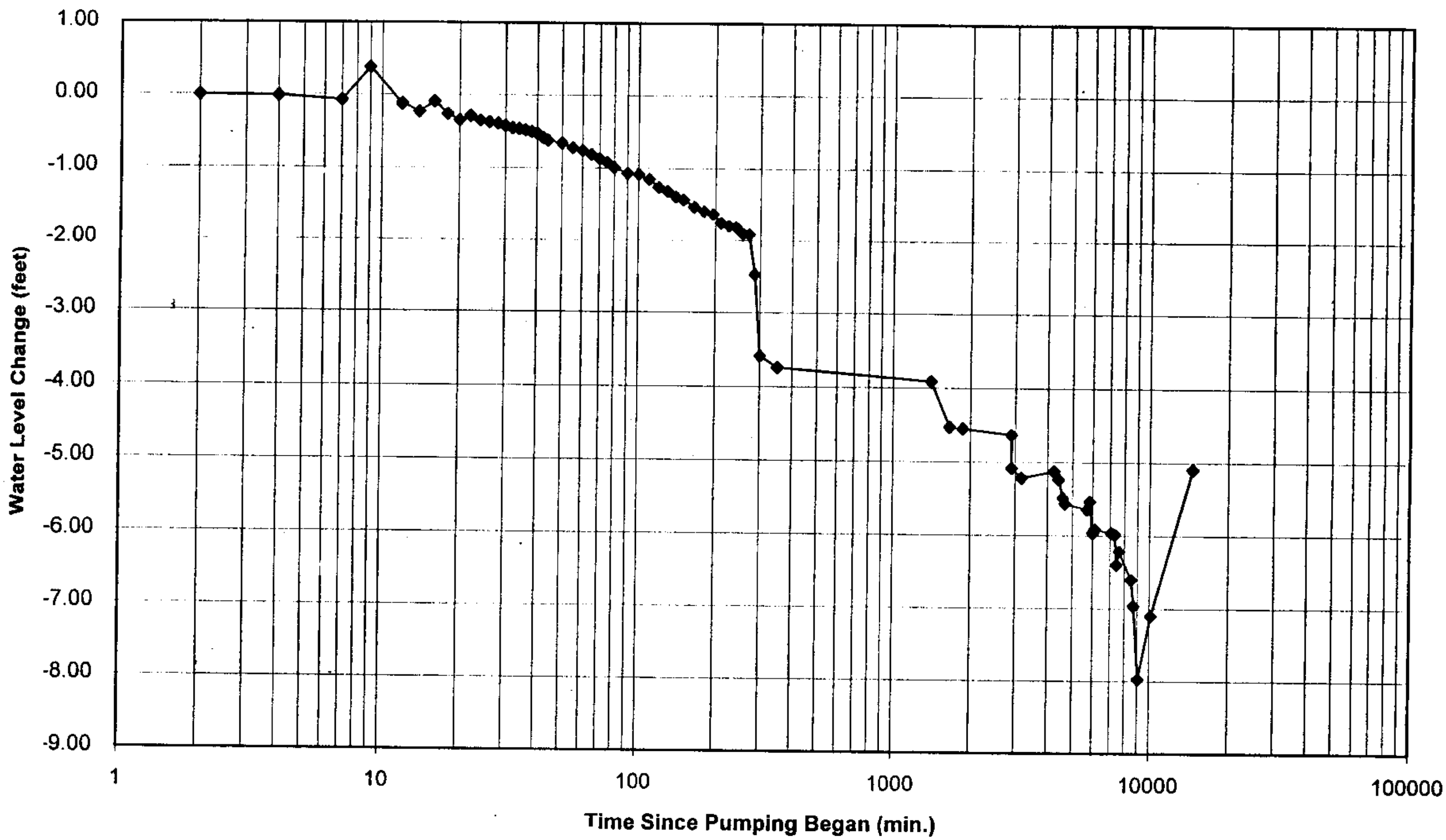
WELL NO.: 47N-2W-22Q01 — DISTANCE FROM PUMPING WELL 818 — TEST TYPE PUMP/DRAWDOWN

MEASURING EQUIPMENT: Sounder DWR #97716 — TEST I.D. OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 19.28 RP - WS | HOW Q MEASURED | N/A |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 HOURS | | | R.P. ELEV: | 4238.6 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 1 | 97 | 12 | 00 | 2910 | | | 23.31 | 4.03 | | | | Steve Sunding |
| 5 | 1 | 97 | 16 | 12 | 3162 | | | 23.40 | 4.12 | | | | |
| 5 | 2 | 97 | 10 | 03 | 4233 | | | 23.79 | 4.51 | | | | |
| 5 | 2 | 97 | 13 | 19 | 4429 | | | 23.87 | 4.59 | | | | |
| 5 | 2 | 97 | 16 | 00 | 4590 | | | 23.91 | 4.63 | | | | |
| 5 | 2 | 97 | 17 | 30 | 4680 | | | 23.95 | 4.67 | | | | |
| 5 | 3 | 97 | 10 | 38 | 5708 | | | 24.47 | 5.19 | | | | |
| 5 | 3 | 97 | 12 | 52 | 5842 | | | 24.52 | 5.24 | | | | |
| 5 | 3 | 97 | 14 | 47 | 5957 | | | 24.52 | 5.24 | | | | Jeff Van Gilder |
| 5 | 3 | 97 | 17 | 20 | 6110 | | | 24.60 | 5.32 | | | | |
| 5 | 4 | 97 | 09 | 30 | 7080 | | | 25.10 | 5.82 | | | | |
| 5 | 4 | 97 | 13 | 10 | 7300 | | | 25.16 | 5.88 | | | | |
| 5 | 4 | 97 | 16 | 00 | 7470 | | | 25.18 | 5.90 | | | | |
| 5 | 4 | 97 | 18 | 00 | 7590 | | | 25.21 | 5.93 | | | | |
| 5 | 5 | 97 | 09 | 15 | 7590 | | | 25.43 | 6.15 | | | | |
| 5 | 5 | 97 | 12 | 15 | 8685 | | | 25.52 | 6.24 | | | | |
| 5 | 5 | 97 | 18 | 14 | 9044 | | | 25.55 | 6.27 | | | | Koll Buer |
| 5 | 6 | 97 | 12 | 14 | 10124 | | | 26.02 | 6.74 | | | | |
| 5 | 9 | 97 | 14 | 41 | 14671 | | | 27.05 | 7.77 | | | | |
| 5 | 9 | 97 | 16 | 01 | 14753 | 0 | | | | | | | PUMP OFF, t'=0 |
| 5 | 9 | 97 | 17 | 23 | 15712 | 82 | | 26.81 | 7.53 | | | | |
| 5 | 10 | 97 | 09 | 22 | 15712 | 1041 | | 24.79 | 5.51 | | | | |

Miller East Irrigation Well(22Q02) Water Level Change
29 April 1997 - 9 May 1997



# AQUIFER TEST DATA

OWNER: Miller East Irrigation Well ADDRESS: SAM'S NECK RD, MACDOEL COUNTY: SISKIYOU STATE: CA
DATE: 04/29-05/09/97 ORGANIZATION PERFORMING TEST: DWR MEASURED BY: MS/JMA/SS/JVG/KYB
WELL NO.: 47N-02W-22Q01 DISTANCE FROM PUMPING WELL 1354 TEST TYPE PUMP/DRAWDOWN
MEASURING EQUIPMENT: STEEL TAPE TEST I.D. OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 23.29 RP-WS | HOW Q MEASURED | |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 HOURS | | | R.P. ELEV: | 4237.8 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE | RATE AF x .001 | GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 28 | 97 | 17 | 20 | | | | 23.31 | 0.02 | | | | | Rowlet Well pumping |
| 4 | 29 | 97 | 09 | 23 | | | | 23.34 | 0.05 | | | | | Mark Souverville |
| 4 | 29 | 97 | 11 | 20 | | | | 23.28 | -0.01 | | | | | |
| 4 | 29 | 97 | 11 | 30 | 0 | | | 23.29 | 0.00 | | | | | Pump on at 7A, t=0 |
| 4 | 29 | 97 | 11 | 32 | 2 | | | 23.29 | 0.00 | | | | | |
| 4 | 29 | 97 | 11 | 34 | 4 | | | 23.30 | 0.01 | | | | | |
| 4 | 29 | 97 | 11 | 37 | 7 | | | 23.36 | 0.07 | | | | | |
| 4 | 29 | 97 | 11 | 39 | 9 | | | 22.91 | -0.38 | | | | | |
| 4 | 29 | 97 | 11 | 42 | 12 | | | 23.42 | 0.13 | | | | | |
| 4 | 29 | 97 | 11 | 44 | 14 | | | 23.40 | 0.11 | | | | | |
| 4 | 29 | 97 | 11 | 46 | 16 | | | 23.52 | 0.23 | | | | | |
| 4 | 29 | 97 | 11 | 48 | 18 | | | 23.38 | 0.09 | | | | | |
| 4 | 29 | 97 | 11 | 50 | 20 | | | 23.55 | 0.26 | | | | | |
| 4 | 29 | 97 | 11 | 52 | 22 | | | 23.63 | 0.34 | | | | | |
| 4 | 29 | 97 | 11 | 54 | 24 | | | 23.58 | 0.29 | | | | | |
| 4 | 29 | 97 | 11 | 56 | 26 | | | 23.57 | 0.28 | | | | | |
| 4 | 29 | 97 | 11 | 58 | 28 | | | 23.64 | 0.35 | | | | | |
| 4 | 29 | 97 | 12 | 00 | 30 | | | 23.66 | 0.37 | | | | | |
| 4 | 29 | 97 | 12 | 02 | 32 | | | 23.68 | 0.39 | | | | | |
| 4 | 29 | 97 | 12 | 04 | 34 | | | 23.71 | 0.42 | | | | | |
| 4 | 29 | 97 | 12 | 06 | 36 | | | 23.74 | 0.45 | | | | | |
| 4 | 29 | 97 | 12 | 08 | 38 | | | 23.75 | 0.46 | | | | | |
| 4 | 29 | 97 | 12 | 10 | 40 | | | 23.77 | 0.48 | | | | | |
| 4 | 29 | 97 | 12 | 12 | 42 | | | 23.79 | 0.50 | | | | | |
| 4 | 29 | 97 | 12 | 14 | 44 | | | 23.82 | 0.53 | | | | | |
| 4 | 29 | 97 | 12 | 20 | 50 | | | 23.87 | 0.58 | | | | | |
| 4 | 29 | 97 | 12 | 25 | 55 | | | 23.91 | 0.62 | | | | | |
| 4 | 29 | 97 | 12 | 30 | 60 | | | 23.95 | 0.66 | | | | | |
| 4 | 29 | 97 | 12 | 35 | 65 | | | 24.01 | 0.72 | | | | | |
| 4 | 29 | 97 | 12 | 40 | 70 | | | 24.05 | 0.76 | | | | | |
| 4 | 29 | 97 | 12 | 45 | 75 | | | 24.10 | 0.81 | | | | | |
| 4 | 29 | 97 | 12 | 50 | 80 | | | 24.16 | 0.87 | | | | | |
| 4 | 29 | 97 | 13 | 00 | 90 | | | 24.21 | 0.92 | | | | | |
| 4 | 29 | 97 | 13 | 10 | 100 | | | 24.28 | 0.99 | | | | | |
| 4 | 29 | 97 | 13 | 20 | 110 | | | 24.36 | 1.07 | | | | | |
| 4 | 29 | 97 | 13 | 30 | 120 | | | 24.37 | 1.08 | | | | | |
| 4 | 29 | 97 | 13 | 40 | 130 | | | 24.44 | 1.15 | | | | | |
| 4 | 29 | 97 | 13 | 50 | 140 | | | 24.55 | 1.26 | | | | | |
| 4 | 29 | 97 | 14 | 00 | 150 | | | 24.60 | 1.31 | | | | | |
| 4 | 29 | 97 | 14 | 15 | 165 | | | 24.68 | 1.39 | | | | | |
| 4 | 29 | 97 | 14 | 30 | 180 | | | 24.72 | 1.43 | | | | | |
| 4 | 29 | 97 | 14 | 45 | 195 | | | 24.82 | 1.53 | | | | | |
| 4 | 29 | 97 | 15 | 00 | 210 | | | 24.88 | 1.59 | | | | | |
| 4 | 29 | 97 | 15 | 15 | 225 | | | 24.92 | 1.63 | | | | | |
| 4 | 29 | 97 | 15 | 30 | 240 | | | 25.04 | 1.75 | | | | | |
| 4 | 29 | 97 | 15 | 45 | 255 | | | 25.08 | 1.79 | | | | | |
| 4 | 29 | 97 | 16 | 00 | 270 | | | 25.10 | 1.81 | | | | | |
| 4 | 29 | 97 | 16 | 15 | 285 | | | 25.19 | 1.90 | | | | | |
| 4 | 29 | 97 | 16 | 30 | 300 | | | 25.20 | 1.91 | | | | | |
| 4 | 29 | 97 | 17 | 22 | 352 | | | 25.76 | 2.47 | | | | | Jon Anderson |
| 4 | 30 | 97 | 10 | 57 | 1407 | | | 26.87 | 3.58 | | | | | |
| 4 | 30 | 97 | 15 | 12 | 1662 | | | 27.03 | 3.74 | | | | | |
| 4 | 30 | 97 | 18 | 41 | 1871 | | | 27.20 | 3.91 | | | | | |
| 5 | 1 | 97 | 11 | 47 | 2897 | | | 27.82 | 4.53 | | | | | |
| 5 | 1 | 97 | 11 | 50 | 2900 | | | 27.84 | 4.55 | | | | | |
| 5 | 1 | 97 | 16 | 20 | 3170 | | | 27.92 | 4.63 | | | | | |
| 5 | 2 | 97 | 10 | 00 | 4230 | | | 28.37 | 5.08 | | | | | Calm, Steve Sunding |
| 5 | 2 | 97 | 13 | 12 | 4422 | | | 28.50 | 5.21 | | | | | Cloudy |
| 5 | 2 | 97 | 15 | 55 | 4585 | | | 28.41 | 5.12 | | | | | Breezy |
| 5 | 2 | 97 | 17 | 30 | 4680 | | | 28.52 | 5.23 | | | | | Breezy |

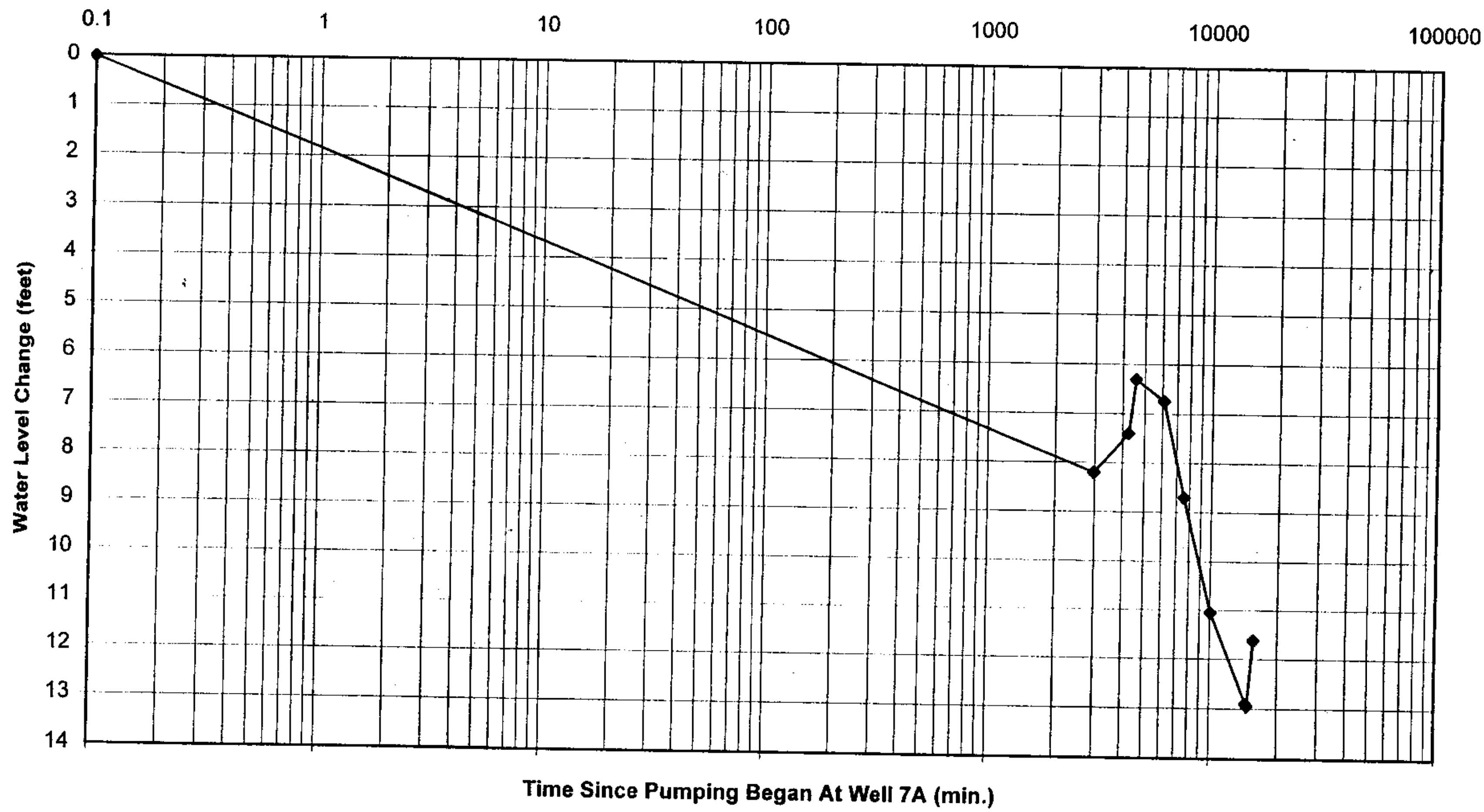
# AQUIFER TEST DATA

| | | | | | |
|---|---|---|---|---|---|
| OWNER: | Miller East Irrigation Well | ADDRESS: | SAM'S NECK RD, MACDOEL | COUNTY: | SISKIYOU | 
| STATE: | CA | | | | |
| DATE: | 04/29-05/09/97 | ORGANIZATION PERFORMING TEST: | DWR | MEASURED BY: | MS/JMA/SS/JVG/KYB |
| WELL NO.: | 47N-02W-22Q01 | DISTANCE FROM PUMPING WELL | 1354 | TEST TYPE | PUMP/DRAWDOWN |
| MEASURING EQUIPMENT: | STEEL TAPE | | | TEST I.D. | OBSERVATION WELL |

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 23.29 RP-WS | HOW Q MEASURED | |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | | | 245 HOURS | | | R.P. ELEV: | 4237.8 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 3 | 97 | 10 | 28 | 5698 | | | 28.77 | 5.48 | | | | Breezy |
| 5 | 3 | 97 | 12 | 45 | 5835 | | | 28.85 | 5.56 | | | | Breezy |
| 5 | 3 | 97 | 15 | 21 | 5991 | | | 28.93 | 5.64 | | | | Windy |
| 5 | 3 | 97 | 17 | 25 | 6115 | | | 28.82 | 5.53 | | | | Windy, Sprinkling |
| 5 | 4 | 97 | 09 | 40 | 7090 | | | 29.25 | 5.96 | | | | Sunny, Jeff Van Gilder |
| 5 | 4 | 97 | 13 | 20 | 7310 | | | 29.20 | 5.91 | | | | Sunny |
| 5 | 4 | 97 | 15 | 10 | 7420 | | | 29.25 | 5.96 | | | | Breeezy |
| 5 | 4 | 97 | 18 | 10 | 7600 | | | 29.27 | 5.98 | | | | Breezy |
| 5 | 5 | 97 | 09 | 20 | 8510 | | | 29.68 | 6.39 | | | | Sunny |
| 5 | 5 | 97 | 12 | 20 | 8690 | | | 29.50 | 6.21 | | | | Sunny |
| 5 | 5 | 97 | 18 | 25 | 9055 | | | 29.89 | 6.60 | | | | Sunny, Koll Buer |
| 5 | 6 | 97 | 12 | 20 | 10130 | | | 30.25 | 6.96 | | | | Sunny |
| 5 | 9 | 97 | 14 | 47 | 14597 | | | 31.26 | 7.97 | | | | Sunny |
| 5 | 9 | 97 | 16 | 01 | 14671 | 0 | | | | | | | PUMP OFF |
| 5 | 9 | 97 | 17 | 27 | | 86 | | 30.39 | 7.10 | | | | Sunny |
| 5 | 10 | 97 | 09 | 29 | | 1048 | | 28.38 | 5.09 | | | | Sunny, blue well |

Rowlett Irrigation Well (23G01) Water Level Change
Aquifer Test of
29 April 1997 - 9 May 1997



# AQUIFER TEST DATA

OWNER: Don Rowlett - Irr.
DATE: 04/29-05/09/97
WELL NO.: 47N-02W-23G01
MEASURING EQUIPMENT: Steel Tape

ADDRESS: Sam's Neck Rd., MacDoel
ORGANIZATION PERFORMING TEST: DWR
DISTANCE FROM PUMPING WELL 7323

COUNTY: SISKIYOU STATE: CA
MEASURED BY: KYB/SS/JVG
TEST TYPE Pump/Drawdown
TEST I.D. Obsevation Well

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | |
|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' |
| TEST DURATION | | | | 245 HOURS | | |

**WATER LEVEL DATA**

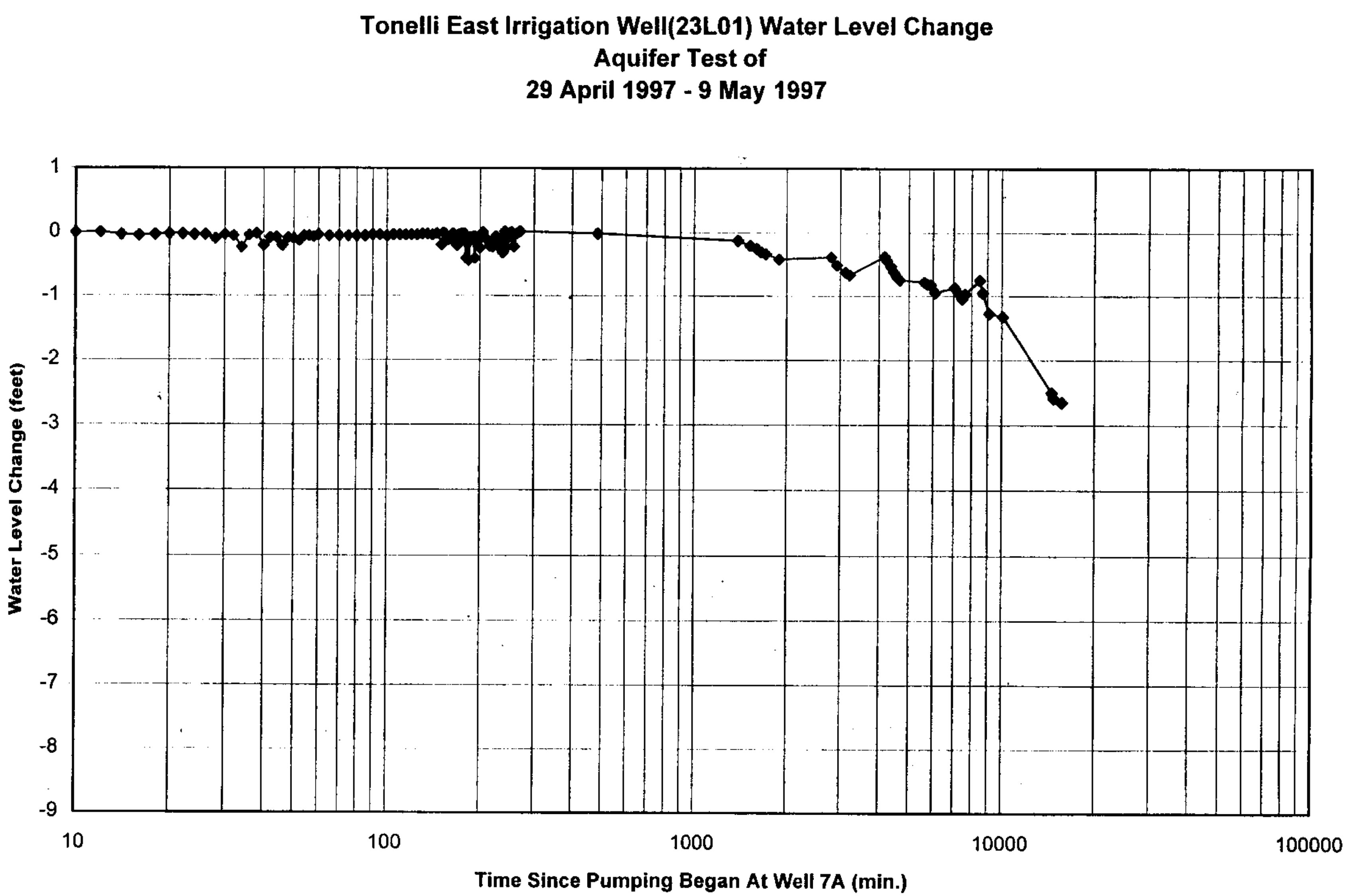
STATIC LEVEL 30.7 RP-WS
R.P. LOCATION
R.P. ELEV: 4247.5

**DISCHARGE DATA**

HOW Q MEASURED
DEPTH OF PUMP/AIR LINE
PREVIOUS PUMPING?
DURATION/END

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 29 | 97 | 11 | 30 | 0 | | | | | | | | PUMP ON, t=0 |
| 5 | 1 | 97 | 13 | 07 | 2977 | | | 38.9 | 8.20 | | | | Pumping, S.Sunding adjacent pump on, well may have been off in AM to move sprink. and oil |
| 5 | 2 | 97 | 10 | 27 | 4257 | | | 38.10 | 7.40 | | | | Pumping |
| 5 | 2 | 97 | 15 | 38 | 4568 | | | 37.00 | 6.30 | | | | |
| 5 | 3 | 97 | 17 | 00 | 6090 | | | 37.44 | 6.74 | | | | Pumping, Jeff Van Gilder |
| 5 | 4 | 97 | 17 | 40 | 7570 | | | 39.40 | 8.70 | | | | Pumping, breezy |
| 5 | 5 | 97 | 11 | 55 | 8665 | | | 45.28 | 14.58 | | | | Pumping, sunny, bad pt? |
| 5 | 6 | 97 | 11 | 13 | 10063 | | | 41.75 | 11.05 | | | | Pumping, sunny, KYB |
| 5 | 9 | 97 | 14 | 08 | 14558 | | | 43.60 | 12.90 | | | | Pumping, sunny |
| 5 | 9 | 97 | 16 | 01 | 14671 | 0 | | | | | | | PUMP OFF, t'=0 |
| 5 | 9 | 97 | 18 | 12 | 14802 | 131 | 113 | 43.64 | 12.94 | | | | |
| 5 | 10 | 97 | 09 | 02 | 15692 | 1021 | 15 | 42.32 | 11.62 | | | | Other Irrig. well not pumping |

Note: Well has been pumping 6 days/week for last two weeks as of 5/1/97
Static Water Level from last years measurments, no current data found(?)


Tonelli East Irrigation Well(23L01) Water Level Change
Aquifer Test of
29 April 1997 - 9 May 1997
Water Level Change (feet)
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
10
100
1000
10000
100000
Time Since Pumping Began At Well 7A (min.)

# AQUIFER TEST DATA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OWNER: | Tonelli East Irrig. near Rd. | ADDRESS: | SAM'S NECK RD, MACDOEL | COUNTY: | SISKIYOU | STATE: | CA |
| DATE: | 04/29-05/09/97 | ORGANIZATION PERFORMING TEST: | DWR | | | MEASURED BY: | KYB/JVG/SSJNE |
| WELL NO.: | 47N-02W-23L01 | DISTANCE FROM PUMPING WELL | 5237 FT | TEST TYPE | PUMP/DRAWDOWN | | |
| MEASURING EQUIPMENT: | STEEL TAPE | | | TEST I.D. | | | OBSERVATION WELL |

| TIME DATA | DATE | | | TIME | | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | MO | DY | YR | HR | MIN | | STATIC LEVEL | 23.22 RP-WS | HOW Q MEASURED | N/A |
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. ELEV: | 4239.9 | PREVIOUS PUMPING? | |
| TEST DURATION | | | | 245 HOURS | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 28 | 97 | 16 | 50 | | | | 24.42 | | | | | Oily, Rowlett well pmpng |
| 4 | 29 | 97 | 09 | 05 | | | | 23.29 | | | | | Noel Eaves, big grn. Well |
| 4 | 29 | 97 | 11 | 00 | | | | 23.23 | | | | | |
| 4 | 29 | 97 | 11 | 10 | | | | 23.22 | | | | | |
| 4 | 29 | 97 | 11 | 20 | | | | 23.22 | | | | | |
| 4 | 29 | 97 | 11 | 30 | 0 | | | 23.20 | -0.02 | | | | PUMP ON, t=0 |
| 4 | 29 | 97 | 11 | 32 | 2 | | | 23.20 | -0.02 | | | | |
| 4 | 29 | 97 | 11 | 34 | 4 | | | 23.22 | 0.00 | | | | |
| 4 | 29 | 97 | 11 | 36 | 6 | | | 23.22 | 0.00 | | | | 1100 thru 1142 RP |
| 4 | 29 | 97 | 11 | 38 | 8 | | | 23.22 | 0.00 | | | | 0.03' less than others |
| 4 | 29 | 97 | 11 | 40 | 10 | | | 23.22 | 0.00 | | | | |
| 4 | 29 | 97 | 11 | 42 | 12 | | | 23.21 | -0.01 | | | | |
| 4 | 29 | 97 | 11 | 44 | 14 | | | 23.25 | 0.03 | | | | Changed RP |
| 4 | 29 | 97 | 11 | 46 | 16 | | | 23.26 | 0.04 | | | | |
| 4 | 29 | 97 | 11 | 48 | 18 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 11 | 50 | 20 | | | 23.24 | 0.02 | | | | |
| 4 | 29 | 97 | 11 | 52 | 22 | | | 23.24 | 0.02 | | | | |
| 4 | 29 | 97 | 11 | 54 | 24 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 11 | 56 | 26 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 11 | 58 | 28 | | | 23.31 | 0.09 | | | | |
| 4 | 29 | 97 | 12 | 00 | 30 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 12 | 02 | 32 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 12 | 04 | 34 | | | 23.45 | 0.23 | | | | |
| 4 | 29 | 97 | 12 | 06 | 36 | | | 23.26 | 0.04 | | | | |
| 4 | 29 | 97 | 12 | 08 | 38 | | | 23.23 | 0.01 | | | | |
| 4 | 29 | 97 | 12 | 10 | 40 | | | 23.42 | 0.20 | | | | |
| 4 | 29 | 97 | 12 | 12 | 42 | | | 23.30 | 0.08 | | | | |
| 4 | 29 | 97 | 12 | 14 | 44 | | | 23.29 | 0.07 | | | | |
| 4 | 29 | 97 | 12 | 16 | 46 | | | 23.42 | 0.20 | | | | |
| 4 | 29 | 97 | 12 | 18 | 48 | | | 23.30 | 0.08 | | | | |
| 4 | 29 | 97 | 12 | 20 | 50 | | | 23.31 | 0.09 | | | | |
| 4 | 29 | 97 | 12 | 22 | 52 | | | 23.34 | 0.12 | | | | |
| 4 | 29 | 97 | 12 | 24 | 54 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 12 | 26 | 56 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 12 | 28 | 58 | | | 23.28 | 0.06 | | | | |
| 4 | 29 | 97 | 12 | 30 | 60 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 12 | 35 | 65 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 12 | 40 | 70 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 12 | 45 | 75 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 12 | 50 | 80 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 12 | 55 | 85 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 13 | 00 | 90 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 13 | 05 | 95 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 13 | 10 | 100 | | | 23.27 | 0.05 | | | | |
| 4 | 29 | 97 | 13 | 15 | 105 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 13 | 20 | 110 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 13 | 25 | 115 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 13 | 30 | 120 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 13 | 35 | 125 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 13 | 40 | 130 | | | 23.24 | 0.02 | | | | |
| 4 | 29 | 97 | 13 | 45 | 135 | | | 23.24 | 0.02 | | | | |
| 4 | 29 | 97 | 13 | 50 | 140 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 13 | 55 | 145 | | | 23.23 | 0.01 | | | | |
| 4 | 29 | 97 | 14 | 00 | 150 | | | 23.41 | 0.19 | | | | |
| 4 | 29 | 97 | 14 | 02 | 152 | | | 23.22 | 0.00 | | | | |
| 4 | 29 | 97 | 14 | 04 | 154 | | | 23.24 | 0.02 | | | | |
| 4 | 29 | 97 | 14 | 06 | 156 | | | 23.28 | 0.06 | | | | |
| 4 | 29 | 97 | 14 | 08 | 158 | | | 23.33 | 0.11 | | | | |
| 4 | 29 | 97 | 14 | 10 | 160 | | | 23.31 | 0.09 | | | | |
| 4 | 29 | 97 | 14 | 12 | 162 | | | 23.24 | 0.02 | | | | |
| 4 | 29 | 97 | 14 | 14 | 164 | | | 23.24 | 0.02 | | | | |

# AQUIFER TEST DATA

OWNER: Tonelli East Irrig. near Rd. ADDRESS: SAM'S NECK RD, MACDOEL COUNTY: SISKIYOU STATE: CA
DATE: 04/29-05/09/97 ORGANIZATION PERFORMING TEST: DWR MEASURED BY: KYB/JVG/SSJNE
WELL NO.: 47N-02W-23L01 DISTANCE FROM PUMPING WELL 5237 FT TEST TYPE PUMP/DRAWDOWN
MEASURING EQUIPMENT: STEEL TAPE TEST I.D. OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | STATIC LEVEL | 23.22 RP-WS | HOW Q MEASURED | N/A |
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. ELEV: | 4239.9 | PREVIOUS PUMPING? | |
| TEST DURATION | | | | 245 HOURS | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 29 | 97 | 14 | 16 | 166 | | | 23.33 | 0.11 | | | | |
| 4 | 29 | 97 | 14 | 18 | 168 | | | 23.42 | 0.20 | | | | |
| 4 | 29 | 97 | 14 | 20 | 170 | | | 23.25 | 0.03 | | | | |
| 4 | 29 | 97 | 14 | 22 | 172 | | | 23.30 | 0.08 | | | | |
| 4 | 29 | 97 | 14 | 24 | 174 | | | 23.23 | 0.01 | | | | |
| 4 | 29 | 97 | 14 | 26 | 176 | | | 23.28 | 0.06 | | | | |
| 4 | 29 | 97 | 14 | 28 | 178 | | | 23.23 | 0.01 | | | | Person drove into home |
| 4 | 29 | 97 | 14 | 30 | 180 | | | 23.62 | 0.40 | | | | across road |
| 4 | 29 | 97 | 14 | 32 | 182 | | | 23.39 | 0.17 | | | | |
| 4 | 29 | 97 | 14 | 34 | 184 | | | 23.65 | 0.43 | | | | |
| 4 | 29 | 97 | 14 | 36 | 186 | | | 23.29 | 0.07 | | | | |
| 4 | 29 | 97 | 14 | 38 | 188 | | | 23.33 | 0.11 | | | | |
| 4 | 29 | 97 | 14 | 40 | 190 | | | 23.28 | 0.06 | | | | |
| 4 | 29 | 97 | 14 | 42 | 192 | | | 23.62 | 0.40 | | | | |
| 4 | 29 | 97 | 14 | 44 | 194 | | | 23.28 | 0.06 | | | | |
| 4 | 29 | 97 | 14 | 46 | 196 | | | 23.36 | 0.14 | | | | |
| 4 | 29 | 97 | 14 | 48 | 198 | | | 23.28 | 0.06 | | | | |
| 4 | 29 | 97 | 14 | 50 | 200 | | | 23.46 | 0.24 | | | | |
| 4 | 29 | 97 | 14 | 55 | 205 | | | 23.21 | -0.01 | | | | |
| 4 | 29 | 97 | 15 | 00 | 210 | | | 23.32 | 0.10 | | | | |
| 4 | 29 | 97 | 15 | 05 | 215 | | | 23.43 | 0.21 | | | | |
| 4 | 29 | 97 | 15 | 10 | 220 | | | 23.44 | 0.22 | | | | |
| 4 | 29 | 97 | 15 | 15 | 225 | | | 23.28 | 0.06 | | | | |
| 4 | 29 | 97 | 15 | 20 | 230 | | | 23.40 | 0.18 | | | | |
| 4 | 29 | 97 | 15 | 25 | 235 | | | 23.48 | 0.26 | | | | |
| 4 | 29 | 97 | 15 | 27 | 237 | | | 23.53 | 0.31 | | | | |
| 4 | 29 | 97 | 15 | 29 | 239 | | | 23.29 | 0.07 | | | | |
| 4 | 29 | 97 | 15 | 31 | 241 | | | 23.20 | -0.02 | | | | |
| 4 | 29 | 97 | 15 | 33 | 243 | | | 23.45 | 0.23 | | | | |
| 4 | 29 | 97 | 15 | 38 | 248 | | | 23.29 | 0.07 | | | | |
| 4 | 29 | 97 | 15 | 43 | 253 | | | 23.21 | -0.01 | | | | |
| 4 | 29 | 97 | 15 | 48 | 258 | | | 23.44 | 0.22 | | | | |
| 4 | 29 | 97 | 15 | 53 | 263 | | | 23.23 | 0.01 | | | | |
| 4 | 29 | 97 | 16 | 00 | 270 | | | 23.20 | -0.02 | | | | |
| 4 | 29 | 97 | 19 | 35 | 485 | | | 23.23 | 0.01 | | | | Jon Anderson |
| 4 | 30 | 97 | 10 | 40 | 1390 | | | 23.34 | 0.12 | | | | |
| 4 | 30 | 97 | 12 | 51 | 1521 | | | 23.42 | 0.20 | | | | windy |
| 4 | 30 | 97 | 14 | 09 | 1599 | | | 23.47 | 0.25 | | | | windy |
| 4 | 30 | 97 | 15 | 00 | 1650 | | | 23.52 | 0.30 | | | | windy |
| 4 | 30 | 97 | 15 | 59 | 1709 | | | 23.55 | 0.33 | | | | windy |
| 4 | 30 | 97 | 18 | 58 | 1888 | | | 23.63 | 0.41 | | | | windy |
| 5 | 1 | 97 | 10 | 10 | 2800 | | | 23.60 | 0.38 | | | | calm |
| 5 | 1 | 97 | 12 | 15 | 2925 | | | 23.73 | 0.51 | | | | calm, Steve Sunding |
| 5 | 1 | 97 | 15 | 30 | 3120 | | | 23.84 | 0.62 | | | | calm |
| 5 | 1 | 97 | 17 | 09 | 3219 | | | 23.88 | 0.66 | | | | calm |
| 5 | 2 | 97 | 09 | 00 | 4170 | | | 23.59 | 0.37 | | | | calm |
| 5 | 2 | 97 | 10 | 15 | 4245 | | | 23.65 | 0.43 | | | | calm |
| 5 | 2 | 97 | 12 | 24 | 4374 | | | 23.75 | 0.53 | | | | calm |
| 5 | 2 | 97 | 14 | 00 | 4470 | | | 23.84 | 0.62 | | | | calm |
| 5 | 2 | 97 | 15 | 45 | 4575 | | | 23.91 | 0.69 | | | | breezy |
| 5 | 2 | 97 | 17 | 20 | 4670 | | | 23.96 | 0.74 | | | | breezy |
| 5 | 3 | 97 | 09 | 15 | 5625 | | | 24.00 | 0.78 | | | | breezy |
| 5 | 3 | 97 | 11 | 30 | 5760 | | | 24.03 | 0.81 | | | | breezy |
| 5 | 3 | 97 | 13 | 49 | 5899 | | | 24.04 | 0.82 | | | | windy |
| 5 | 3 | 97 | 17 | 15 | 6105 | | | 24.16 | 0.94 | | | | sunny, Jeff Van Gilder |
| 5 | 4 | 97 | 09 | 00 | 7050 | | | 24.09 | 0.87 | | | | sunny |
| 5 | 4 | 97 | 13 | 00 | 7290 | | | 24.18 | 0.96 | | | | sunny |
| 5 | 4 | 97 | 15 | 54 | 7464 | | | 24.26 | 1.04 | | | | breezy |
| 5 | 4 | 97 | 18 | 20 | 7610 | | | 24.19 | 0.97 | | | | sunny |
| 5 | 5 | 97 | 09 | 00 | 8490 | | | 23.97 | 0.75 | | | | sunny |
| 5 | 5 | 97 | 12 | 05 | 8675 | | | 24.17 | 0.95 | | | | sunny, Koll Buer |

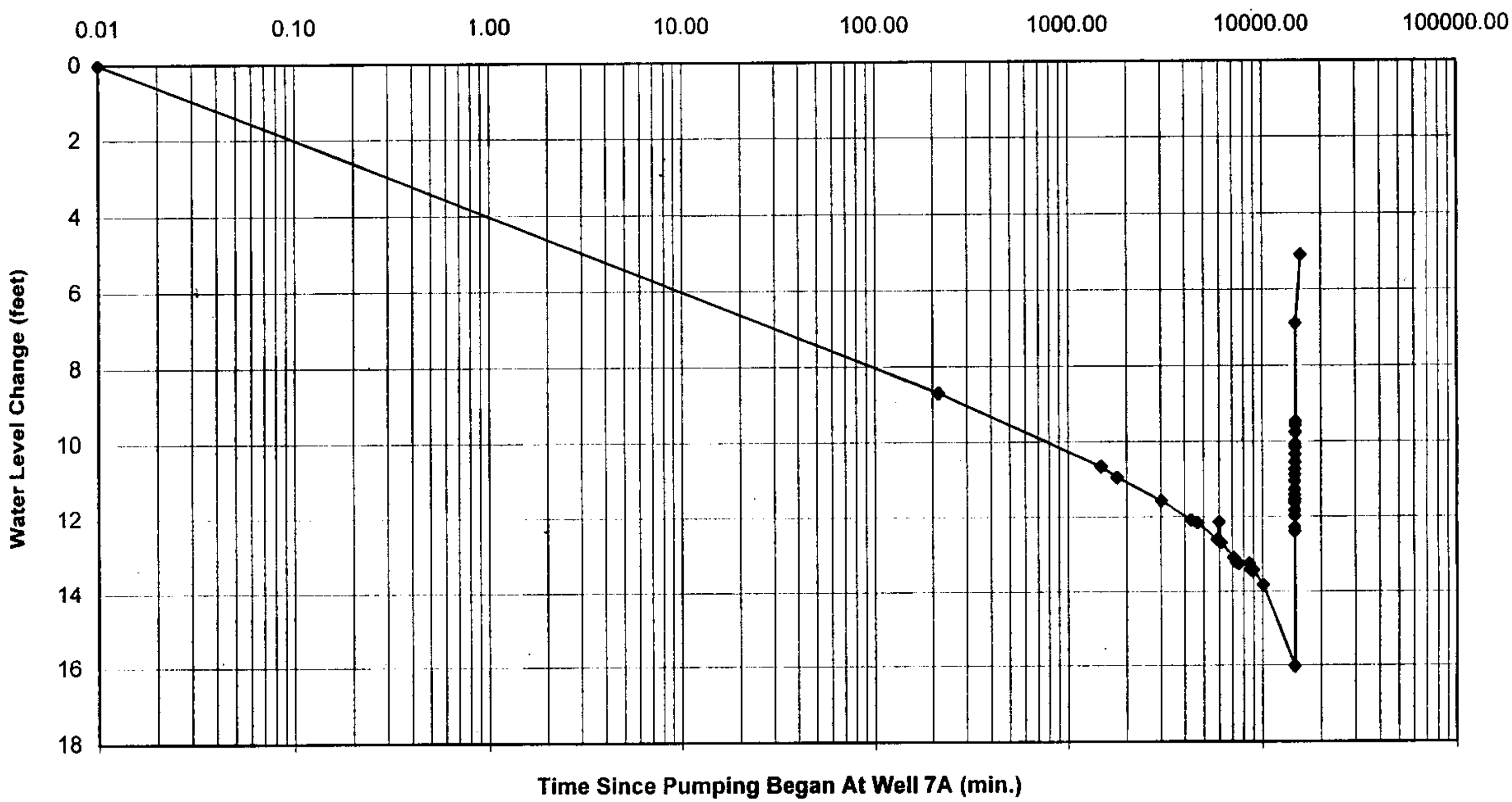
## AQUIFER TEST DATA

OWNER: Tonelli East Irrig. near Rd. ADDRESS: SAM'S NECK RD, MACDOEL COUNTY: SISKIYOU STATE: CA
DATE: 04/29-05/09/97 ORGANIZATION PERFORMING TEST: DWR MEASURED BY: KYB/JVG/SSJNE
WELL NO.: 47N-02W-23L01 DISTANCE FROM PUMPING WELL 5237 FT TEST TYPE PUMP/DRAWDOWN
MEASURING EQUIPMENT: STEEL TAPE TEST I.D. OBSERVATION WELL

| TIME DATA | DATE MO | DY | YR | TIME HR | MIN | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | STATIC LEVEL | 23.22 RP-WS | HOW Q MEASURED | N/A |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. LOCATION | | DEPTH OF PUMP/AIR LINE | |
| TEST DURATION | | 245 HOURS | | | | | R.P. ELEV: | 4239.9 | PREVIOUS PUMPING? | |
| | | | | | | | | | DURATION/END | |

| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 5 | 97 | 19 | 30 | 9120 | | | 24.49 | 1.27 | | | | sunny |
| 5 | 6 | 97 | 11 | 30 | 10080 | | | 24.54 | 1.32 | | | | sunny |
| 5 | 9 | 97 | 14 | 27 | 14577 | | | 25.72 | 2.50 | | | | Irrig. strtd across Rd. |
| 5 | 9 | 97 | 16 | 01 | 14671 | | | | | | | | PUMP OFF |
| 5 | 9 | 97 | 18 | 05 | 14795 | 124 | 119 | 25.81 | 2.59 | | | | OILY |
| 5 | 10 | 97 | 09 | 16 | 15706 | 1035 | 15 | 25.87 | 2.65 | | | | IRRIG. STARTED |

DFG Well 7A (27C01) Water Level Change
Aquifer Test of
29 April 1997 - 9 May 1997



## AQUIFER TEST DATA

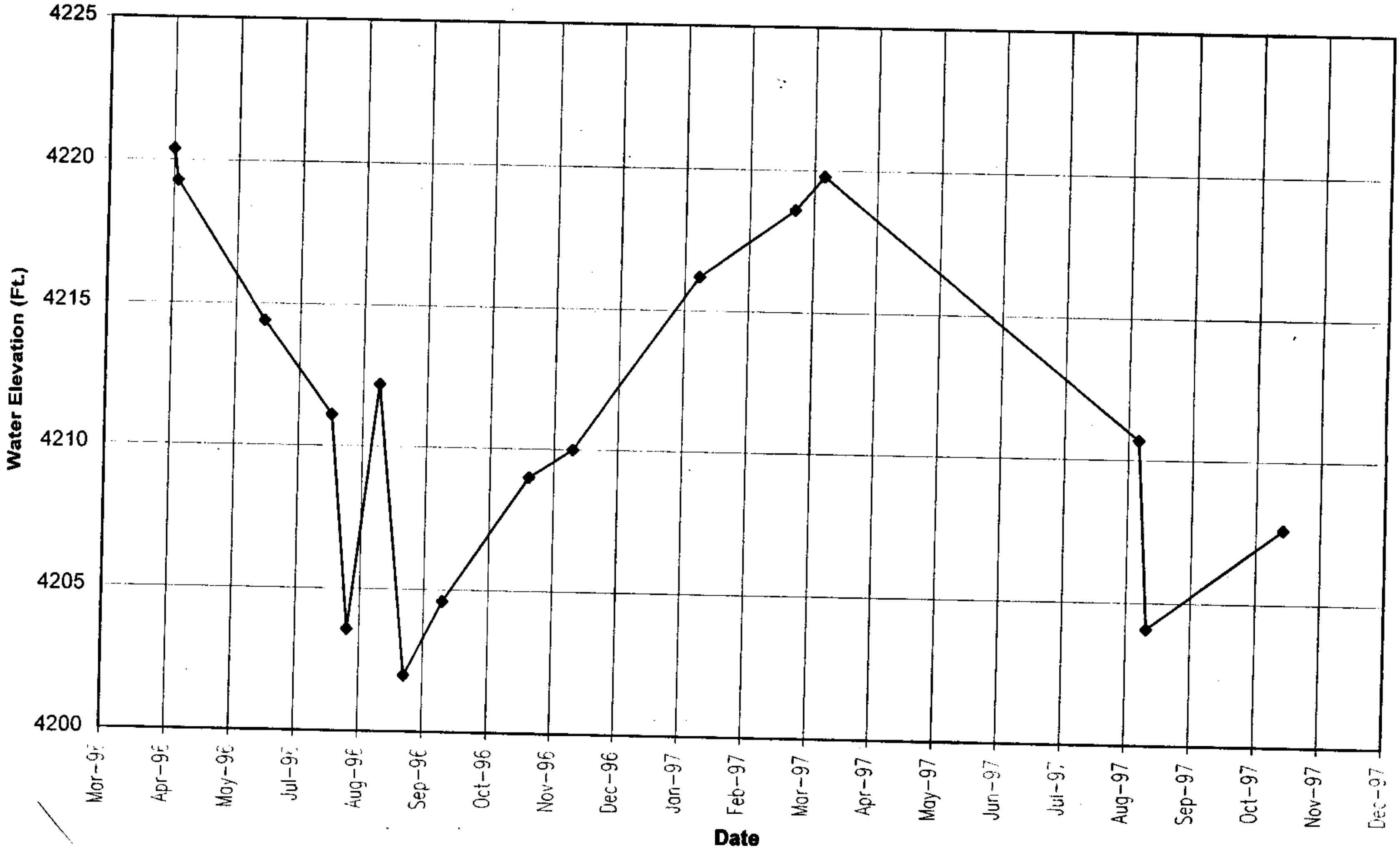
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| OWNER: | DFG - #7A | ADDRESS: | SAM'S NECK RD, MACDOEL | COUNTY: | SISKIYOU | STATE: | CA |
| DATE: | 04/29-05/09/97 | ORGANIZATION PERFORMING TEST: | DWR | | | MEASURED BY: | S. Sunding, K. Buer, J. VanGilder |
| WELL NO.: | 47N-02W-27C01 | DISTANCE FROM PUMPING WELL: | ZERO | TEST TYPE | PUMP/DRAWDOWN | | |
| MEASURING EQUIPMENT: | | | | TEST I.D. | PUMPING WELL | | |

| | TIME DATA | | | | | | WATER LEVEL DATA | | DISCHARGE DATA | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DATE | | | TIME | | | | | | |
| | MO | DY | YR | HR | MIN | | STATIC LEVEL | 21.41 RP-WS | HOW Q MEASURED | ULTRASONIC |
| PUMP ON | 4 | 29 | 97 | 11 | 30 | t | R.P. LOCATIO | Hole in pump base | DEPTH OF PUMP/AIR LINE | |
| PUMP OFF | 5 | 9 | 97 | 16 | 01 | t' | R.P. ELEV: | 4241.40 FT | PREVIOUS PUMPING? | |
| TEST DURATION | | | | 245 HOURS | | | | | DURATION/END | |

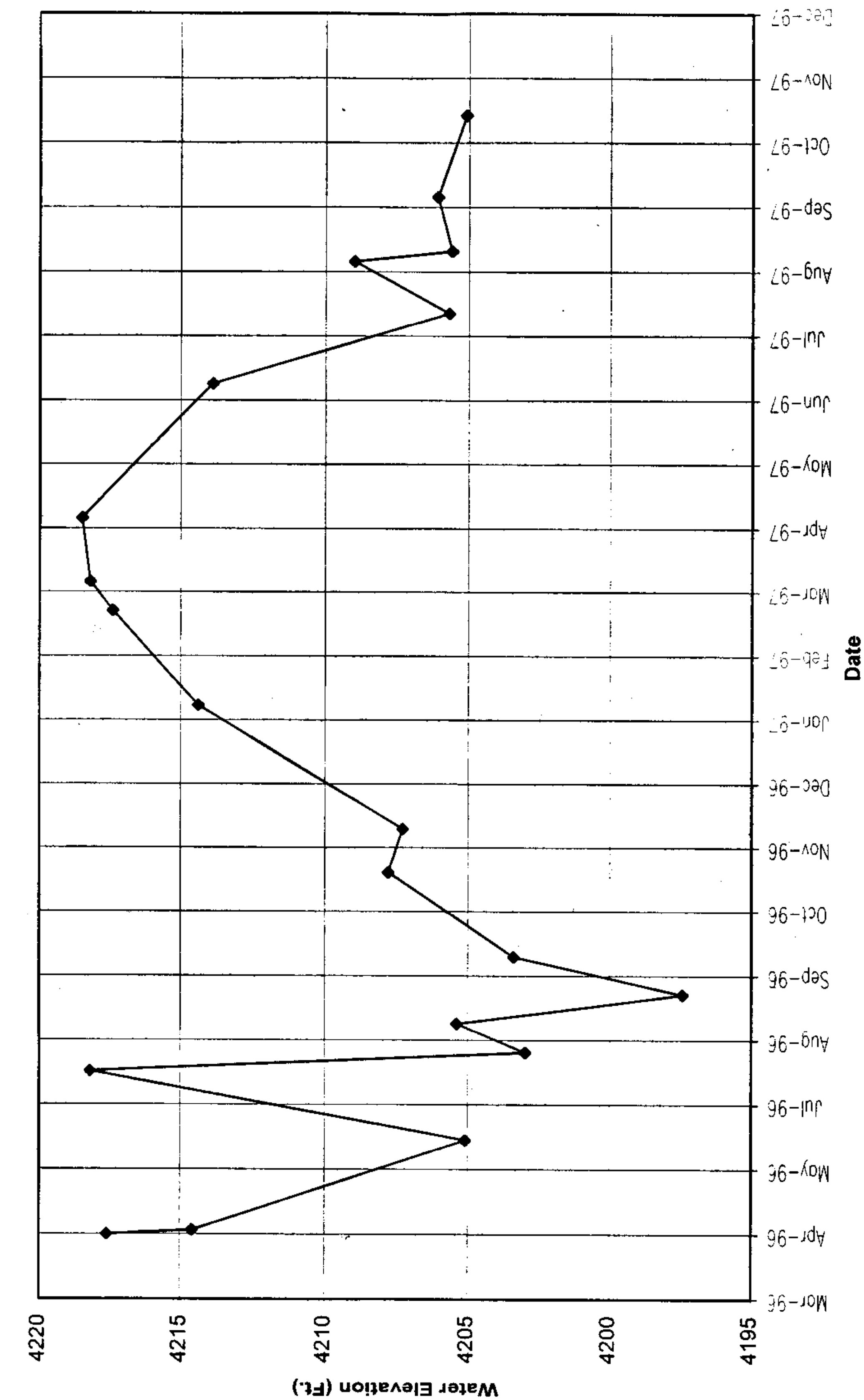
| DATE MO | DY | YR | CLOCK TIME HR | MIN | TIME FROM START t | TIME FROM STOP t' | t/t' | GROUND WATER LEVEL | WATER LEVEL CHANGE | CUMULATIVE RGE AF x .001 | RATE GPM | ELEC METER READING KW | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 28 | 97 | 16 | 30 | | | | 21.38 | -0.03 | | | | Oily |
| 4 | 29 | 97 | 11 | 26 | | | | 21.41 | 0.00 | | | | |
| 4 | 29 | 97 | 11 | 30 | 0 | | | | | | | | PUMP ON, t=O |
| 4 | 29 | 97 | 15 | 05 | 215 | | | 30.10 | 8.69 | | | | Pumping, oily,18.1°C, EC=345 |
| 4 | 30 | 97 | 12 | 10 | 1480 | | | 32.06 | 10.65 | | | | Pumping, oily, 17.7°C, EC=350 |
| 4 | 30 | 97 | 17 | 20 | 1790 | | | 32.35 | 10.94 | | 3,700 | | Pumping, oily, 17.4°C, EC=350 |
| 5 | 1 | 97 | 13 | 47 | 3017 | | | 32.98 | 11.57 | | | | Pumping, oily. 17.8°C, EC=345 |
| 5 | 2 | 97 | 11 | 30 | 4320 | | | 33.49 | 12.08 | | 4260 | | Pumping, oily, 17.7°C, EC=342 |
| 5 | 2 | 97 | 17 | 00 | 4650 | | | 33.56 | 12.15 | | 4450 | | windy, SS, 17.7°C, EC=347 |
| 5 | 3 | 97 | 13 | 20 | 5870 | | | 34.01 | 12.60 | | | | windy, pmpng, 17.7°C, EC=348 |
| 5 | 3 | 97 | 15 | 30 | 6000 | | | 33.55 | 12.14 | | 4825 | | pmpng, JVG, 17.7°C, EC=346 |
| 5 | 3 | 97 | 17 | 45 | 6135 | | | 34.10 | 12.69 | | 4360 | | sprinkling, 17.7°C, EC=346 |
| 5 | 4 | 97 | 10 | 30 | 7140 | | | 34.50 | 13.09 | | | | Sunny,17.7°C, EC=352 |
| 5 | 4 | 97 | 14 | 00 | 7350 | | | 34.62 | 13.21 | | 4380 | | sunny, breezy, 17.8°C, EC=348 |
| 5 | 4 | 97 | 16 | 40 | 7510 | | | 34.65 | 13.24 | | 4314 | | sunny, 17.7°C, EC=347 |
| 5 | 4 | 97 | 18 | 10 | 7600 | | | 34.65 | 13.24 | | 4277 | | sunny, 17.7°C, EC=347 |
| 5 | 5 | 97 | 10 | 20 | 8570 | | | 34.65 | 13.24 | | 4430 | | sunny, 17.7°C, EC=346 |
| 5 | 5 | 97 | 12 | 25 | 8695 | | | 34.82 | 13.41 | | | | breezy, 17.8°C, EC=350 |
| 5 | 5 | 97 | 14 | 30 | 8820 | | | 34.85 | 13.44 | | | | |
| 5 | 5 | 97 | 16 | 55 | 8965 | | | 34.83 | 13.42 | | | | |
| 5 | 6 | 97 | 11 | 49 | 10099 | | | 35.23 | 13.82 | | | | 17.8°C, EC=344 |
| 5 | 9 | 97 | 15 | 44 | 14654 | | | 37.42 | 16.01 | | | | |
| 5 | 9 | 97 | 16 | 01 | 14671 | 0 | | | | | | | PUMP OFF, t'=0 |
| 5 | 9 | 97 | 16 | 02 | 14672 | 1 | | 33.80 | 12.39 | | | | 1.24' of oil on water |
| 5 | 9 | 97 | 16 | 03 | 14673 | 2 | 7337 | 33.80 | 12.39 | | | | |
| 5 | 9 | 97 | 16 | 04 | 14674 | 3 | 4891 | 33.69 | 12.28 | | | | |
| 5 | 9 | 97 | 16 | 05 | 14675 | 4 | 3669 | 33.39 | 11.98 | | | | |
| 5 | 9 | 97 | 16 | 07 | 14677 | 6 | 2446 | 33.24 | 11.83 | | | | |
| 5 | 9 | 97 | 16 | 08 | 14678 | 7 | 2097 | 33.04 | 11.63 | | | | |
| 5 | 9 | 97 | 16 | 10 | 14680 | 9 | 1631 | 32.96 | 11.55 | | | | |
| 5 | 9 | 97 | 16 | 12 | 14682 | 11 | 1335 | 32.84 | 11.43 | | | | |
| 5 | 9 | 97 | 16 | 15 | 14685 | 14 | 1049 | 32.69 | 11.28 | | | | |
| 5 | 9 | 97 | 16 | 20 | 14690 | 19 | 773 | 32.47 | 11.06 | | | | |
| 5 | 9 | 97 | 16 | 25 | 14695 | 24 | 612 | 32.29 | 10.88 | | | | |
| 5 | 9 | 97 | 16 | 30 | 14700 | 29 | 507 | 32.15 | 10.74 | | | | |
| 5 | 9 | 97 | 16 | 40 | 14710 | 39 | 377 | 31.96 | 10.55 | | | | |
| 5 | 9 | 97 | 16 | 50 | 14720 | 49 | 300 | 31.75 | 10.34 | | | | |
| 5 | 9 | 97 | 17 | 00 | 14730 | 59 | 250 | 31.56 | 10.15 | | | | |
| 5 | 9 | 97 | 17 | 10 | 14740 | 69 | 214 | 31.47 | 10.06 | | | | |
| 5 | 9 | 97 | 17 | 34 | 14764 | 93 | 159 | 31.17 | 9.76 | | | | |
| 5 | 9 | 97 | 18 | 00 | 14790 | 119 | 124 | 30.98 | 9.57 | | | | |
| 5 | 9 | 97 | 18 | 20 | 14810 | 139 | 107 | 30.88 | 9.47 | | | | |
| 5 | 9 | 97 | 18 | 21 | 14811 | 140 | 106 | 28.29 | 6.88 | | | | Tape Data Logger Placed |
| 5 | 10 | 97 | 10 | 14 | 15764 | 1093 | 14 | 26.49 | 5.08 | | | | Tape msred, Data Log: 12.32(?) |

# Appendix D
# Monitoring Well Groundwater Levels

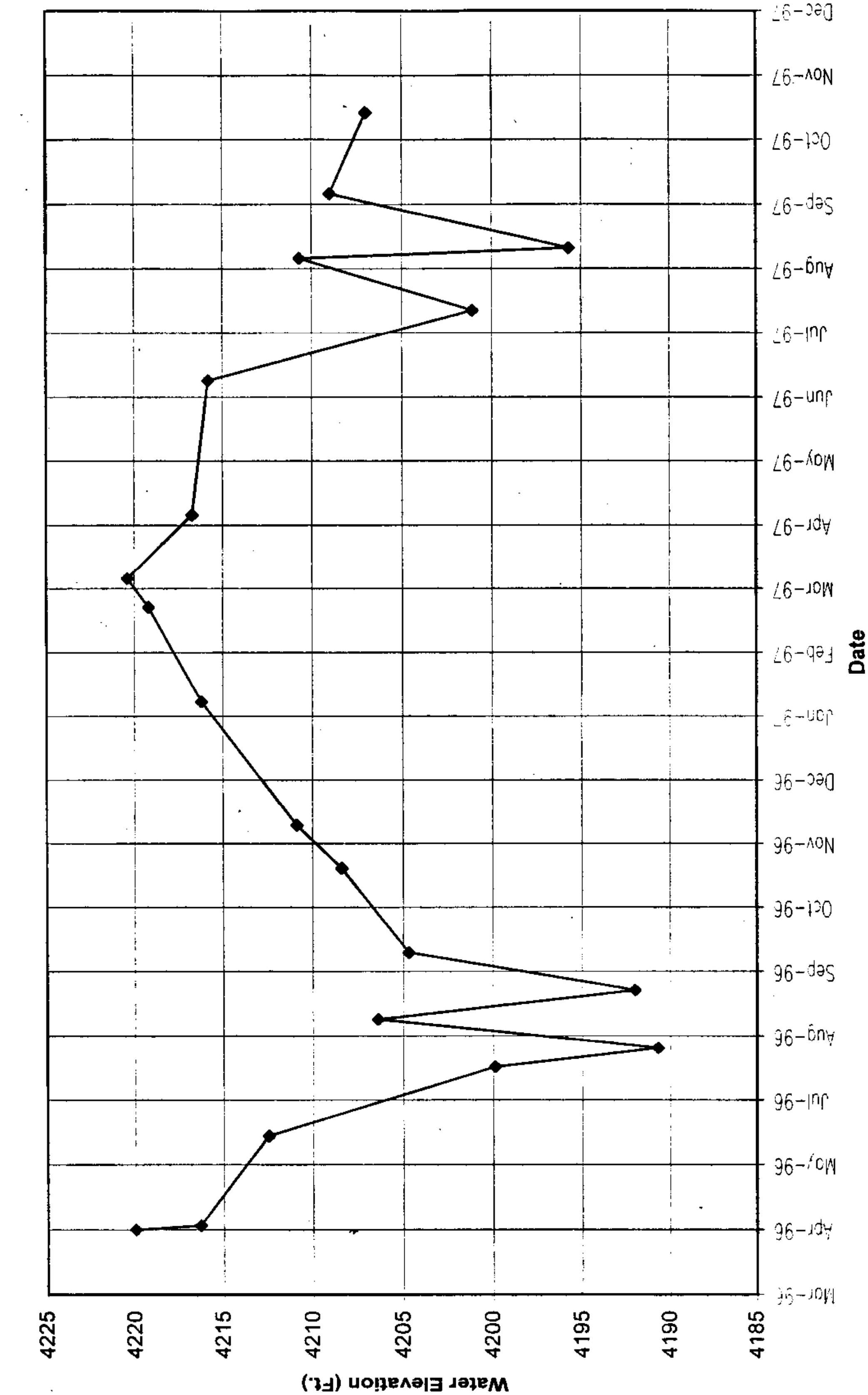
**Groundwater Levels--47N/02W-16G01--April 1996 to October 1997, Butte Valley, Ca.**



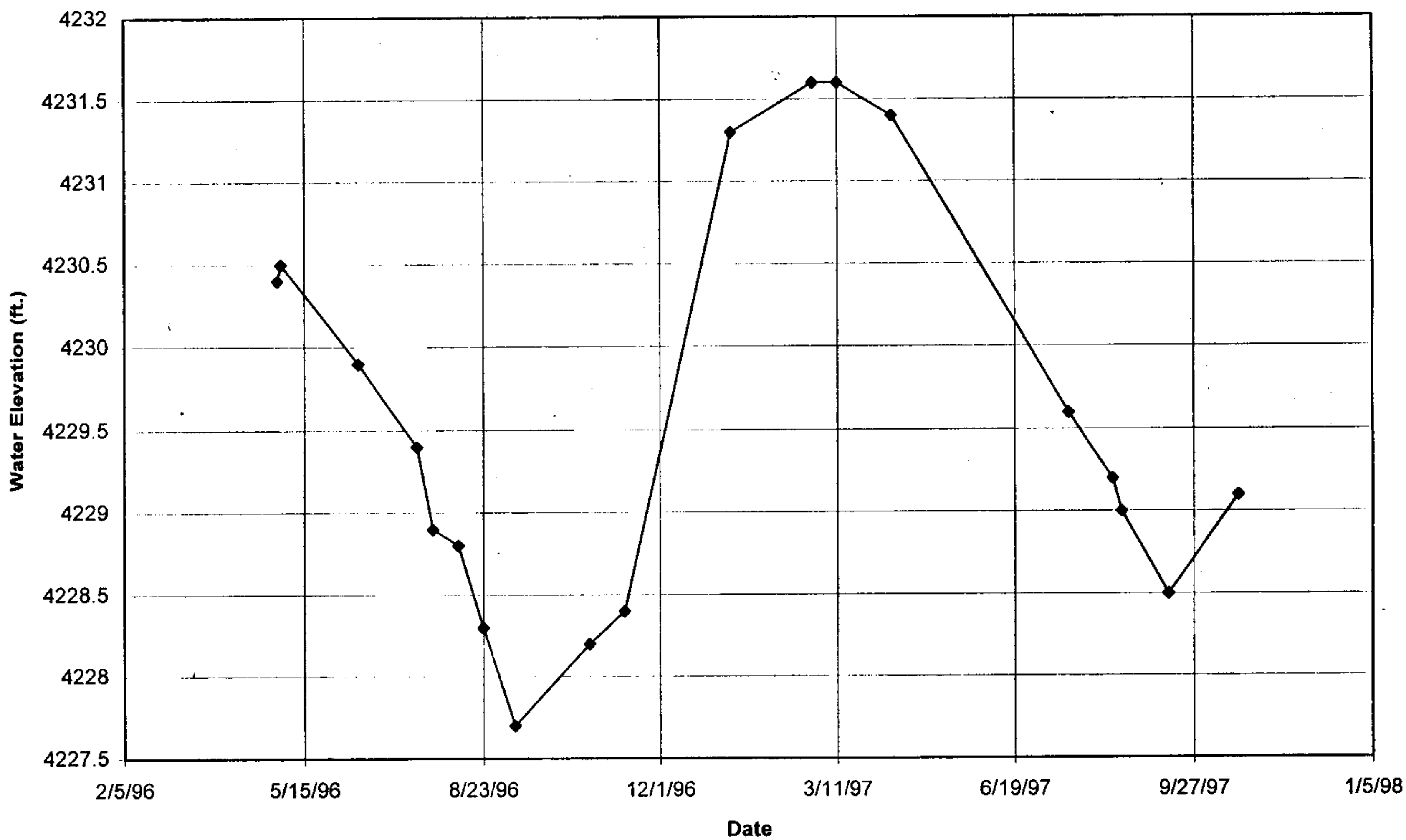
Groundwater Level--47N/02W-16P02--April 1996 to October 1997, Butte Valley, Ca.



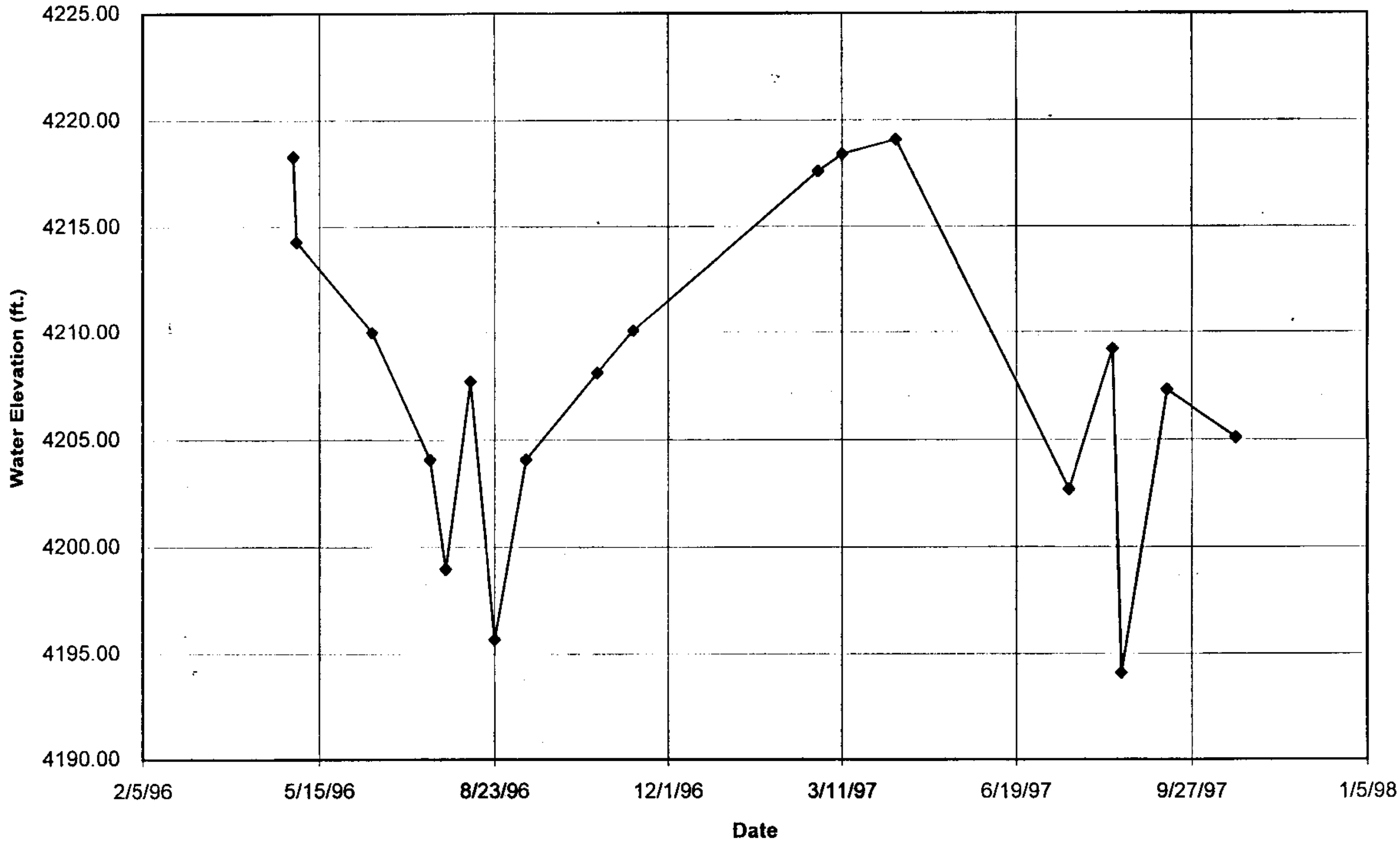
**Groundwater Levels--47N/02W-21B01--April 1996 to October 1997, Butte Valley, Ca.**

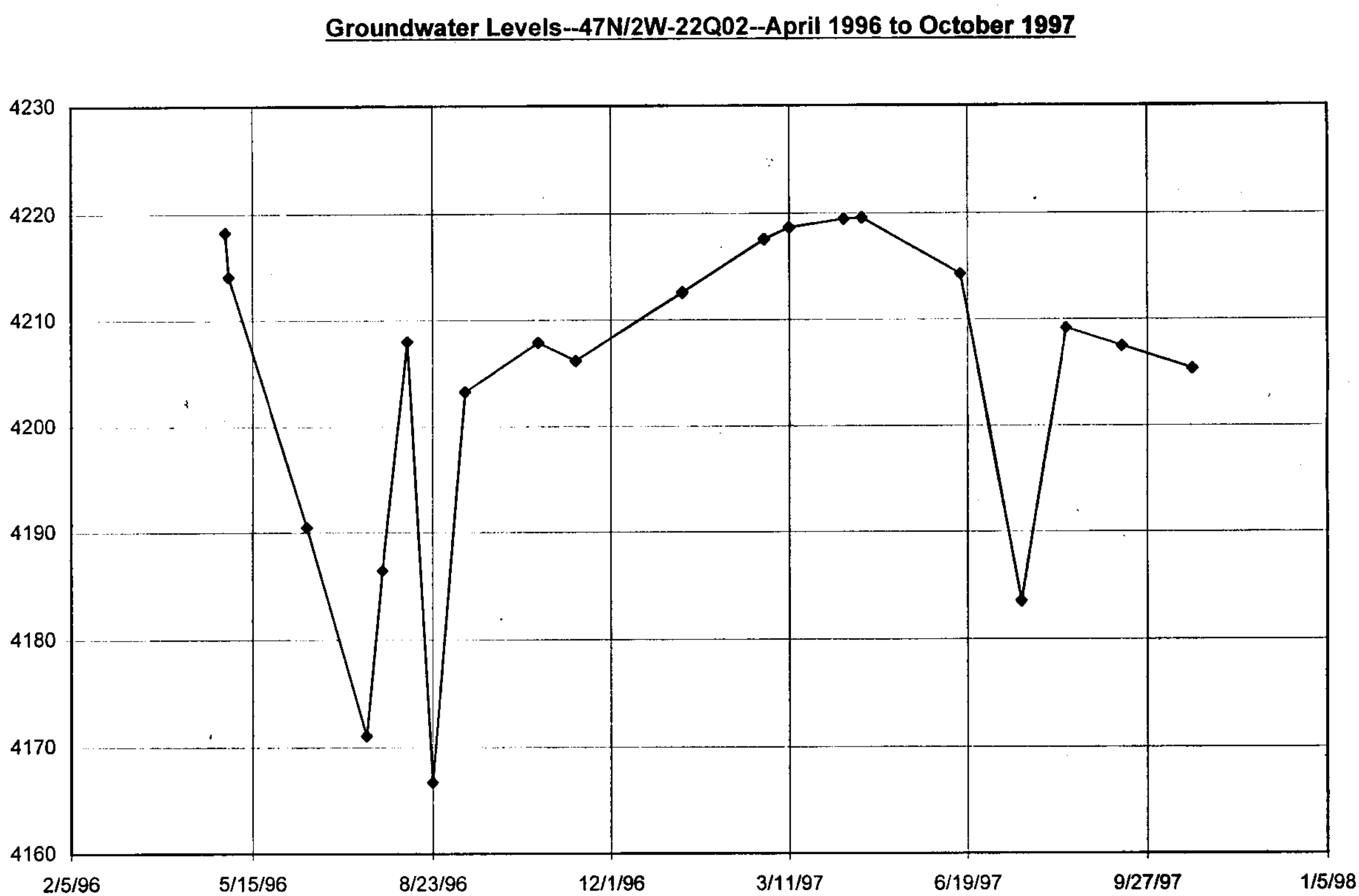


## Groundwater Levels--47N/2W-22P01--April 1996 to October 1997, Butte Valley, Ca.

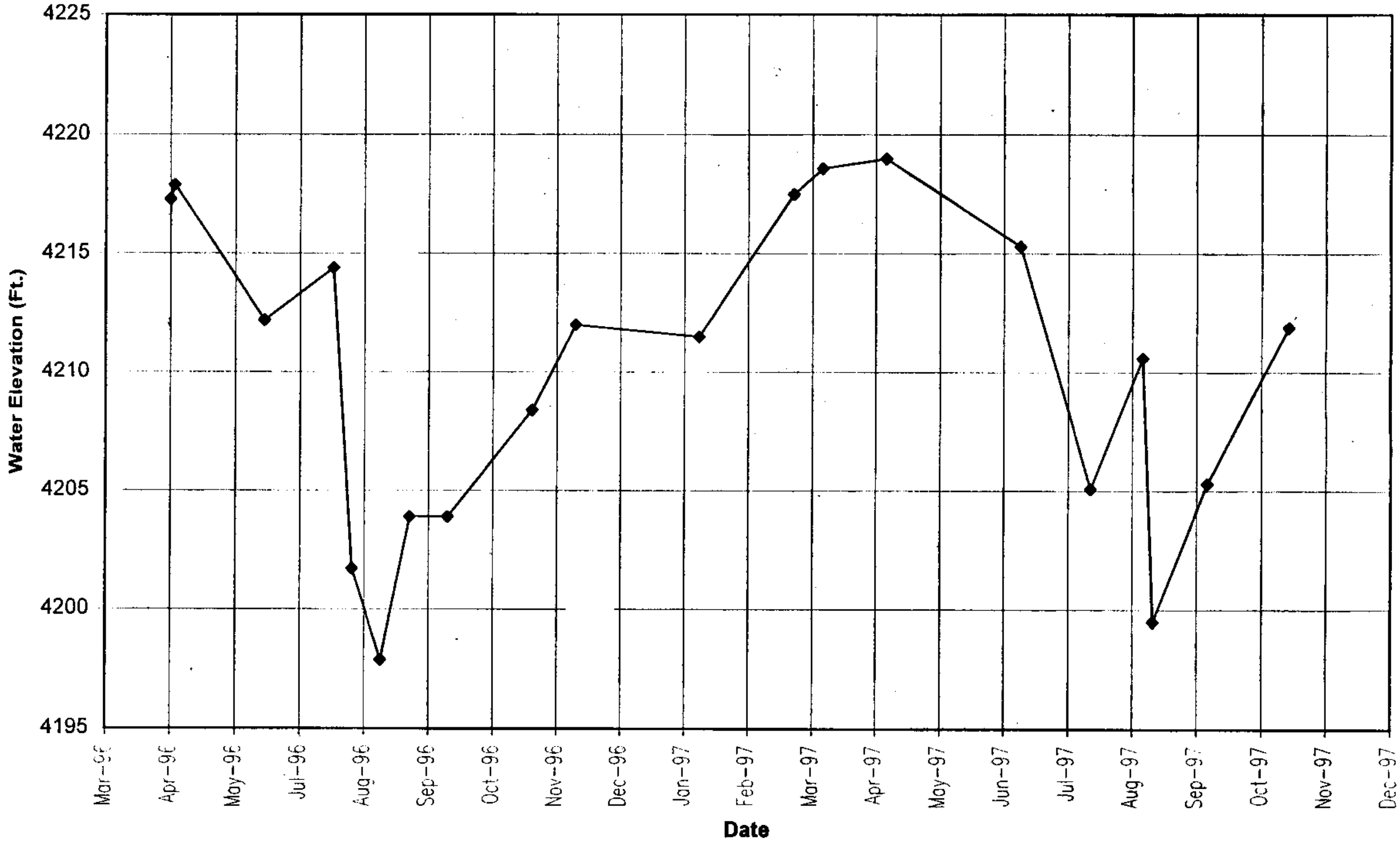


## Groundwater Levels--47N/2W-22Q01--April 1996 to October 1997, Butte Valley, Ca.

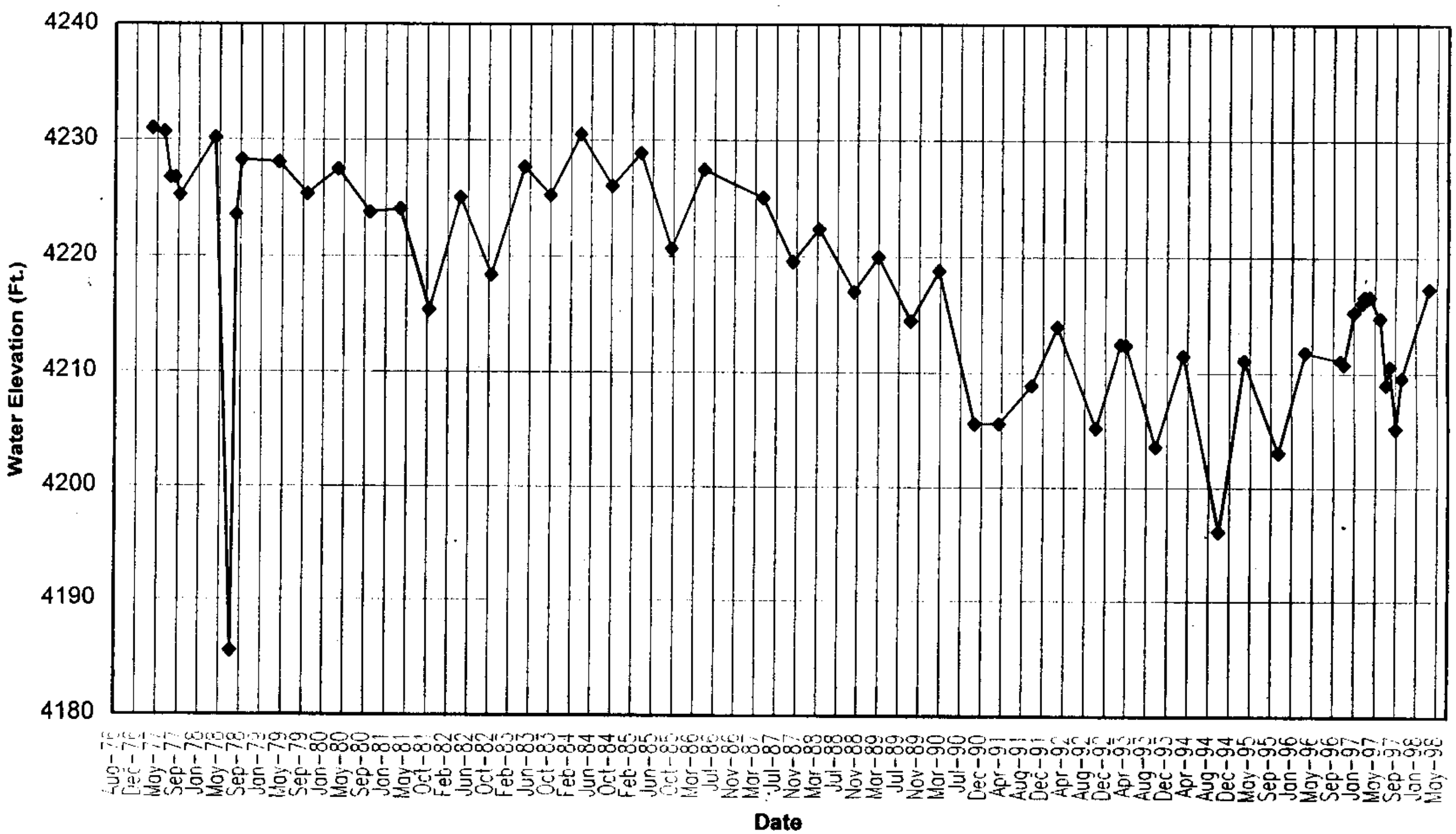



Groundwater Levels--47N/2W-22Q02--April 1996 to October 1997
4230
4220
4210
4200
4190
4180
4170
4160
2/5/96
5/15/96
8/23/96
12/1/96
3/11/97
6/19/97
9/27/97
1/5/98

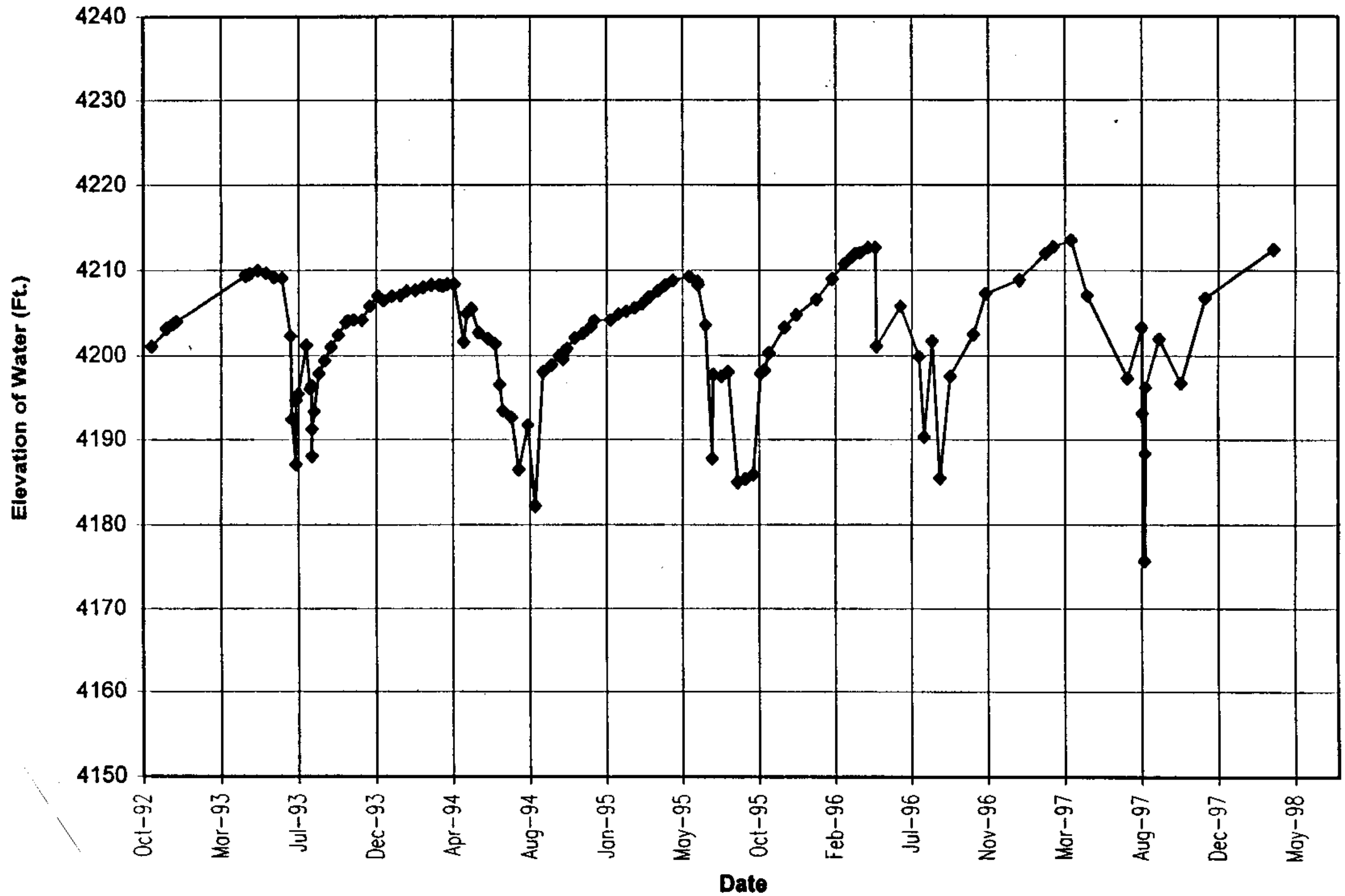
## Groundwater Levels--47N/02W-23G01--April 1996 to October 1997, Butte Valley, Ca.



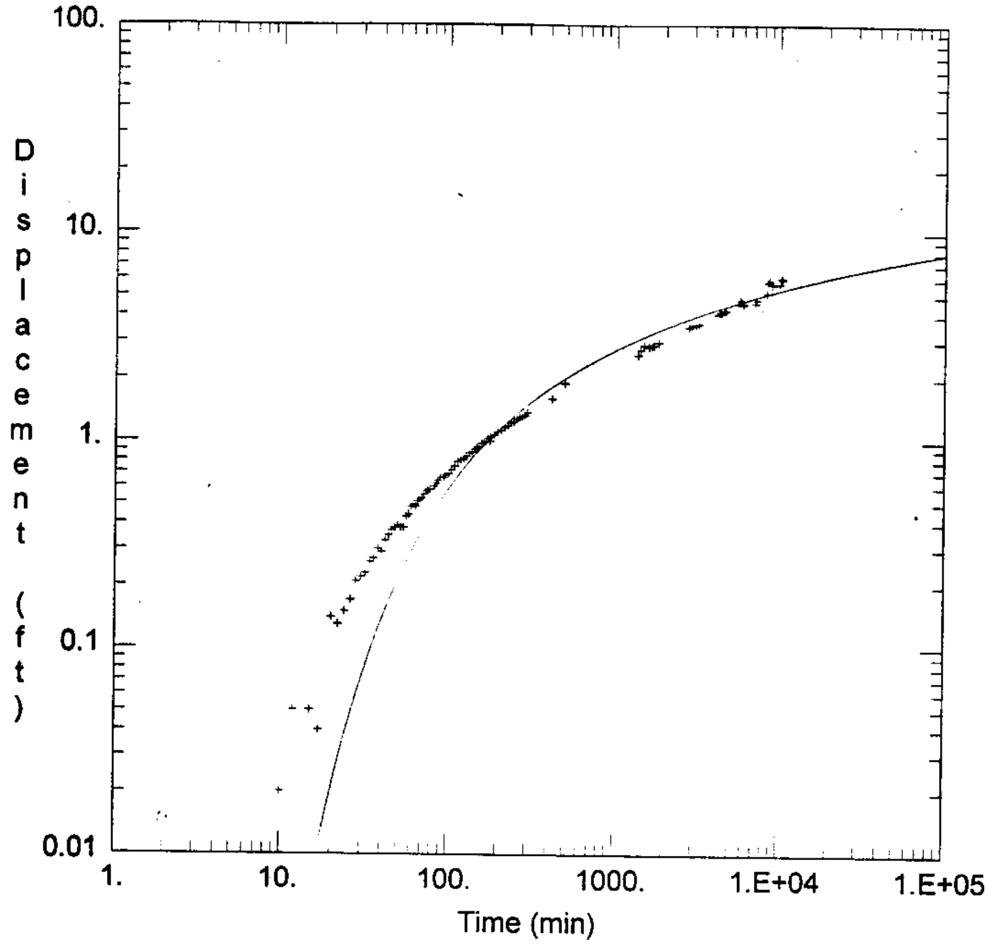
Groundwater Levels -47N/02W-23L01 - April 1977 to October 1997, Butte Valley, Ca



Groundwater Levels Well 47N/02W-27C01M--1992 to 1998 Butte Valley, Ca.



# Appendix E
# Analyses of Aquifer Characteristics




PROJECT INFORMATION

Company: DWR
Test Location: Butte Valley
Test Well: DFG 7A(47N/2W-27C01)
Test Date: 4/29-5/9 1997

AQUIFER DATA

Saturated Thickness: 800. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Well 7A | 0 | 0 |

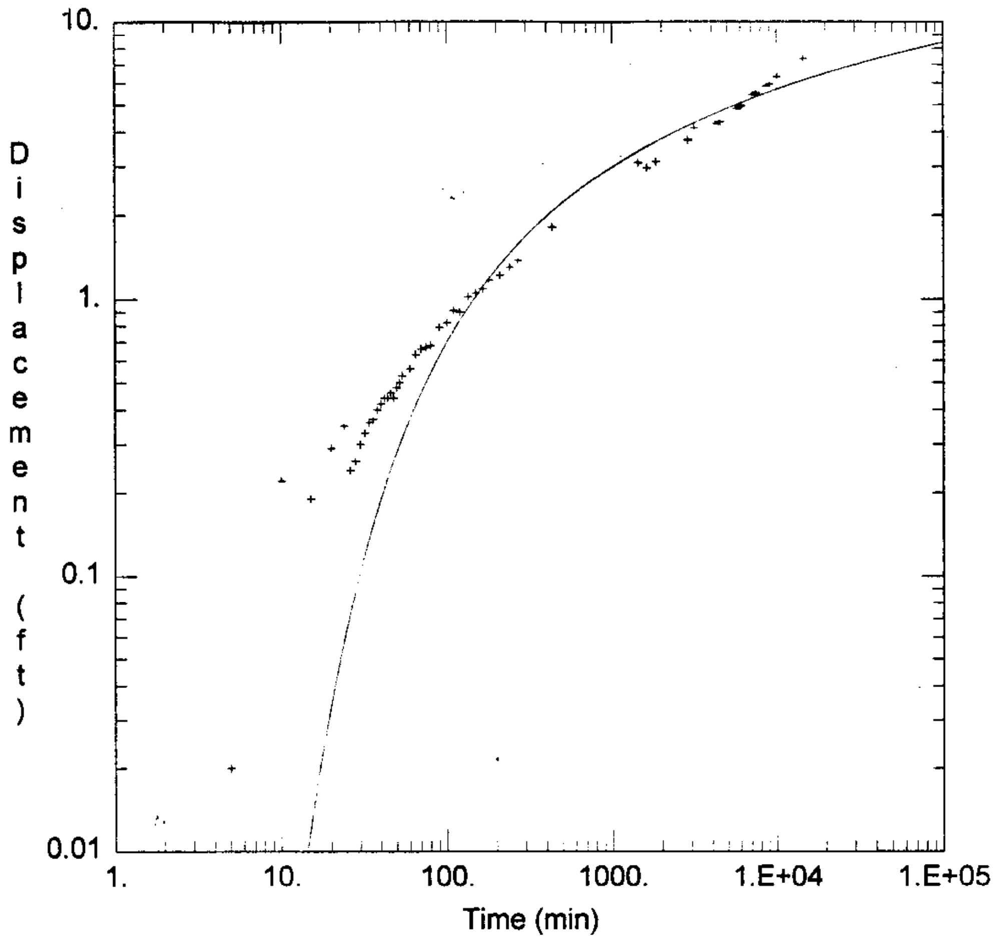
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Mill. Irr W | 6259 | 0 |

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 295.1 $ft^2/min$
S = 0.00168




## PROJECT INFORMATION

Company: DWR
Test Location: Butte Valley
Test Well: DFG 7A(47N/2W-27C01)
Test Date: 4/29-5/9 1997

## AQUIFER DATA

Saturated Thickness: 800. ft

Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Well 7A | 0 | 0 |

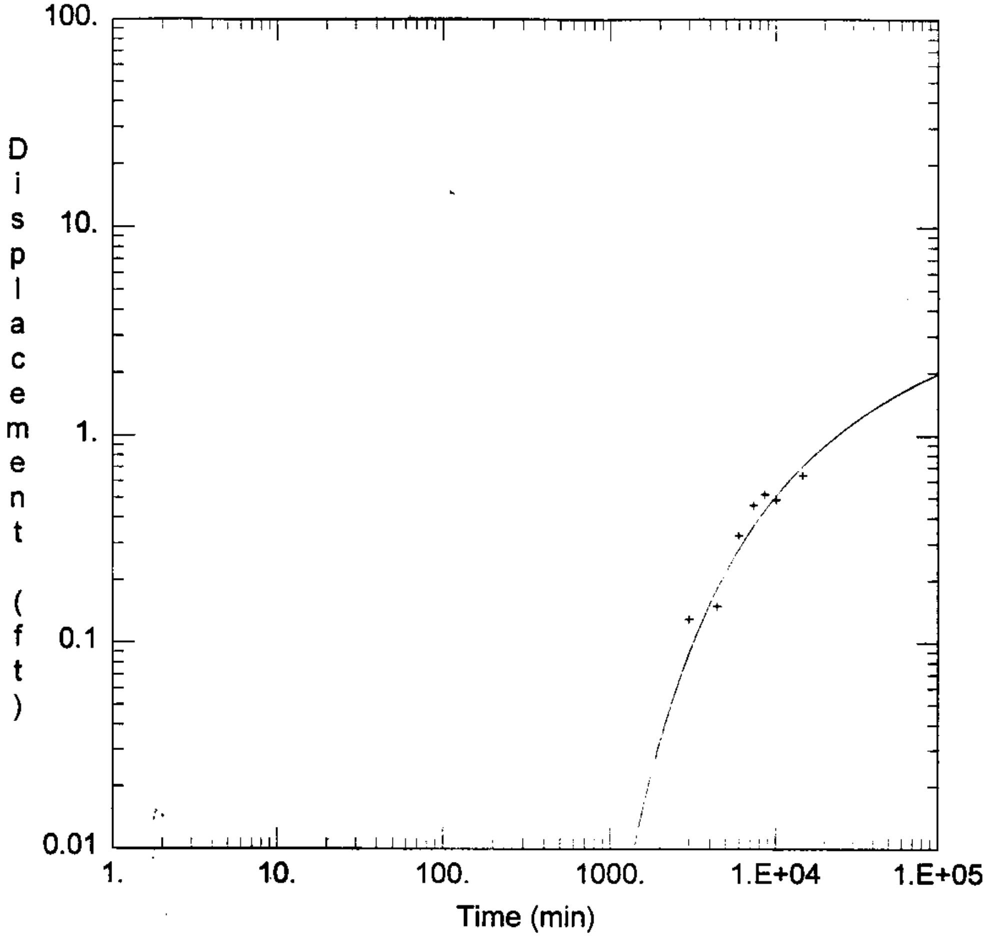
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Tonelli West | 6259 | 0 |

## SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 287.4 $ft^2$/min
S = 0.001406




PROJECT INFORMATION

Company: DWR
Test Location: Butte Valley
Test Well: DFG 7A(47N/2W-27C01)
Test Date: 4/29-5/9 1997

AQUIFER DATA

Saturated Thickness: 800. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Well 7A | 0 | 0 |

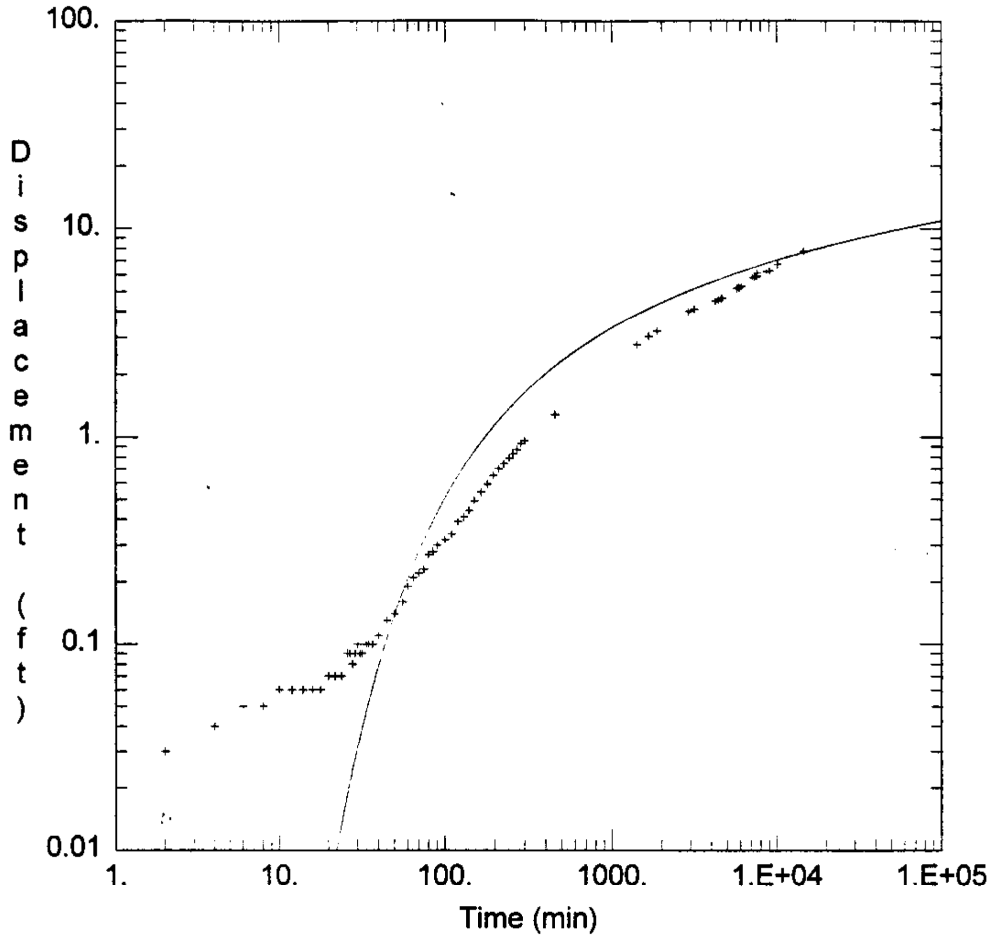
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| + Cav. Stock | 1207 | 0 |

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 457.3 $ft^2$/min
S = 5.217




## PROJECT INFORMATION

Company: DWR
Test Location: Butte Valley
Test Well: DFG 7A(47N/2W-27C01)
Test Date: 4/29-5/9 1997

## AQUIFER DATA

Saturated Thickness: 800. ft

Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Well 7A | 0 | 0 |

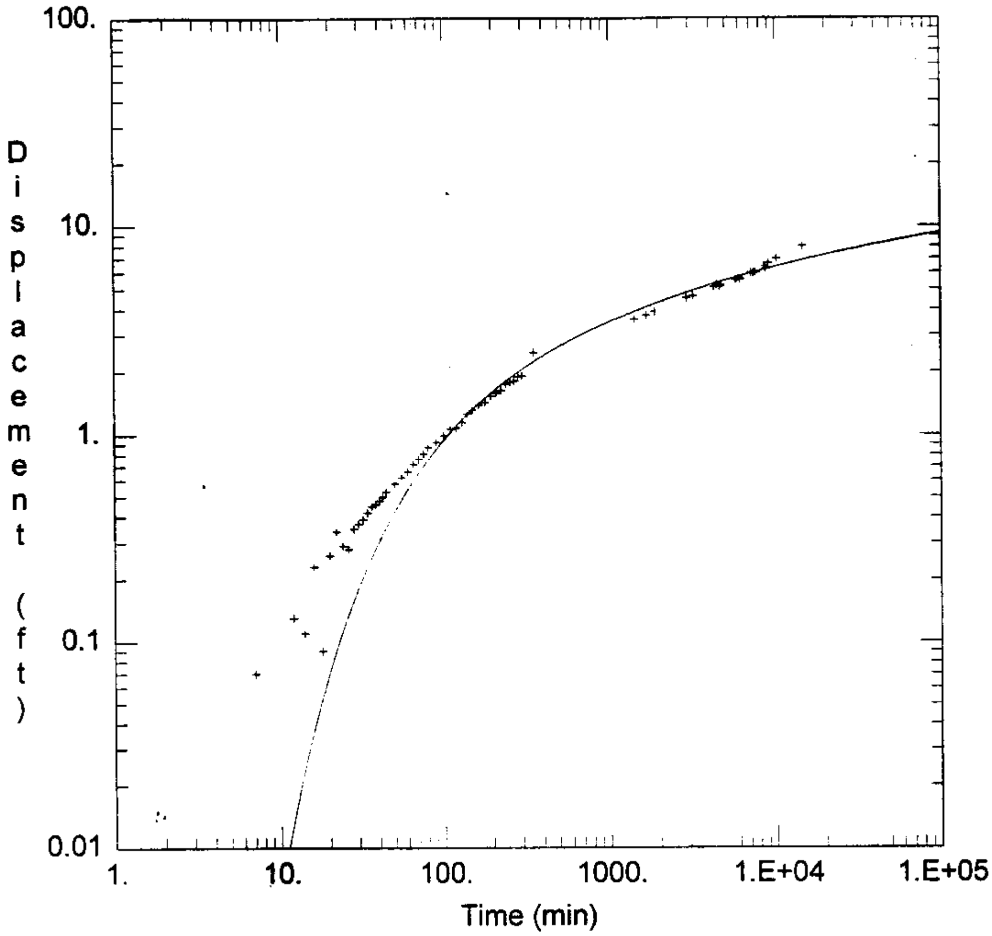
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Miller Dom. | 818 | 0 |

## SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 205.5 $ft^2$/min
S = 0.1




## PROJECT INFORMATION

Company: DWR
Test Location: Butte Valley
Test Well: DFG 7A(47N/2W-27C01)
Test Date: 4/29-5/9 1997

## AQUIFER DATA

Saturated Thickness: 800. ft

Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Well 7A | 0 | 0 |

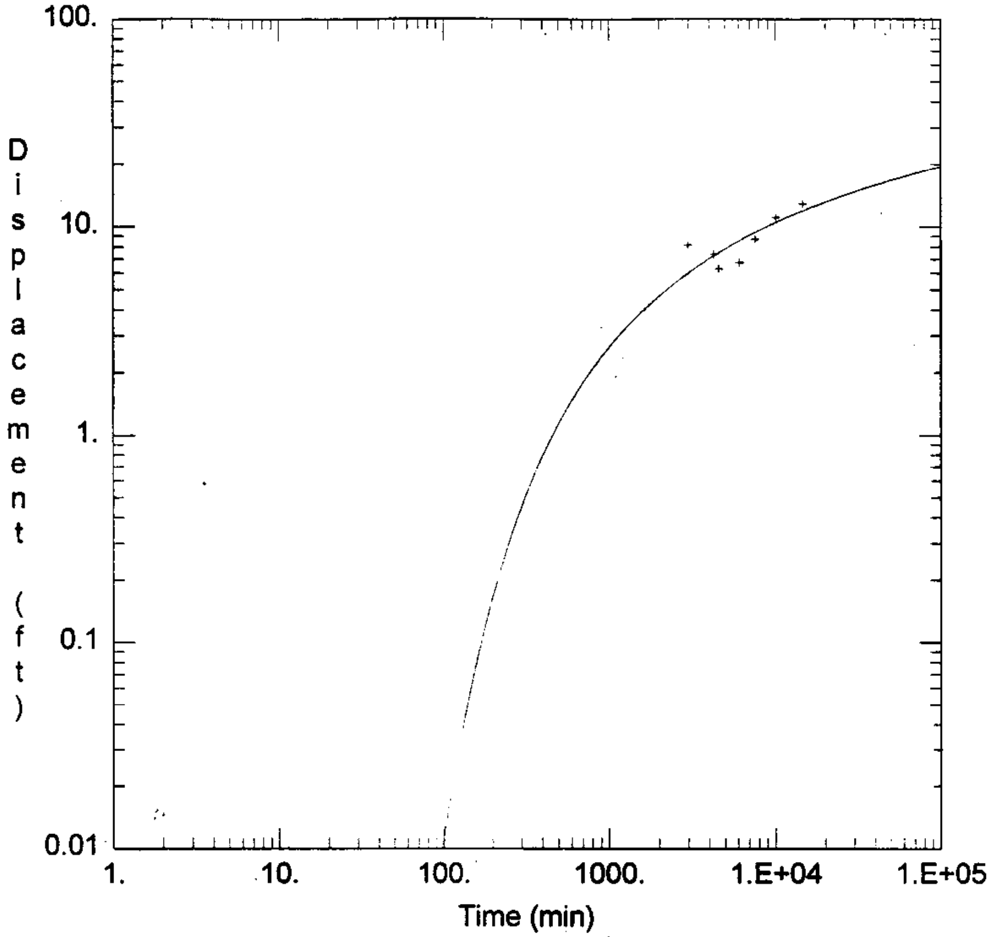
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| + Mill. Irr E | 1354 | 0 |

## SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 269.2 $ft^2/min$
S = 0.02224




## PROJECT INFORMATION

Company: DWR
Test Location: Butte Valley
Test Well: DFG 7A(47N/2W-27C01)
Test Date: 4/29-5/9 1997

## AQUIFER DATA

Saturated Thickness: 800. ft

Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Well 7A | 0 | 0 |

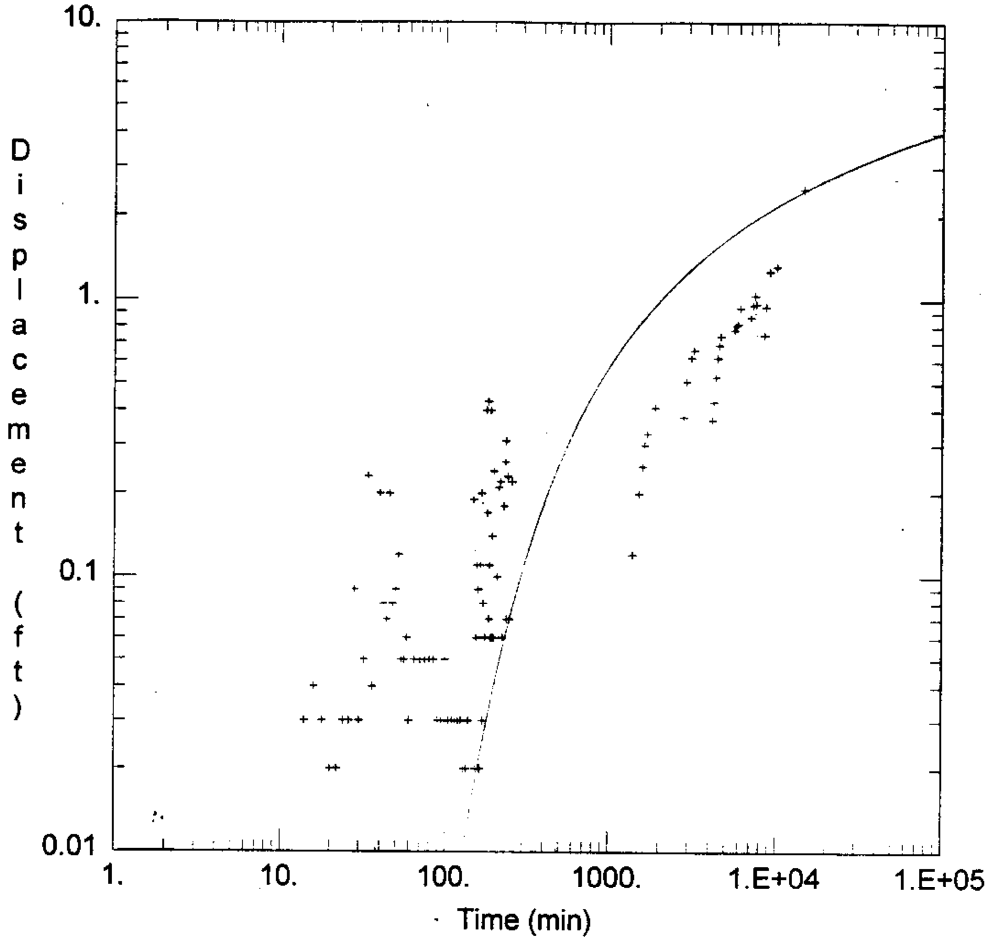
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| + Rowlett Irr. | 7323 | 0 |

## SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 85.84 $ft^2/min$
S = 0.002718




PROJECT INFORMATION

Company: DWR
Test Location: Butte Valley
Test Well: DFG 7A(47N/2W-27C01)
Test Date: 4/29-5/9 1997

AQUIFER DATA

Saturated Thickness: 800. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Well 7A | 0 | 0 |

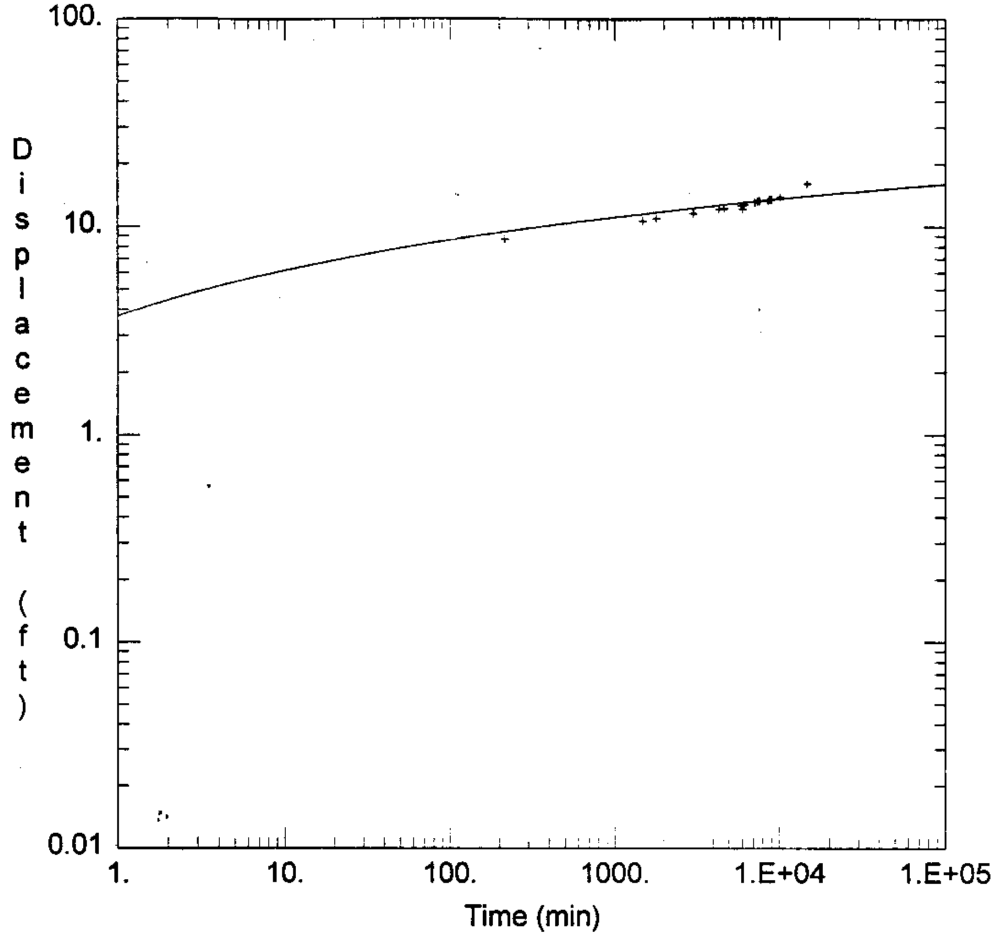
Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| + Tonelli East | 5237 | 0 |

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 422.3 $ft^2$/min
S = 0.02452




## PROJECT INFORMATION

Company: DWR
Test Location: Butte Valley
Test Well: DFG 7A(47N/2W-27C01)
Test Date: 4/29-5/9 1997

## AQUIFER DATA

Saturated Thickness: 800. ft

Anisotropy Ratio (Kz/Kr): 1.

## WELL DATA

Pumping Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| Well 7A | 0 | 0 |

Observation Wells

| Well Name | X (ft) | Y (ft) |
|---|---|---|
| DFG Well 7A | 0 | 0 |

## SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 320.3 $ft^2/min$
S = 0.1344

**State of California**
**The Resources Agency**
**Department of Water Resources**
**Northern District**

Pete Wilson
Governor
State of California

Douglas P. Wheeler
Secretary for Resources
The Resources Agency

David N. Kennedy
Director
Department of Water Resources